954

ELECTRICAL REVIEW

Henley's are supplying and installing approximately 7 miles of 0.30 sq. in. 3-core 110kV. Oil-Filled Cable, together with auxiliary cables and accessories to link the Belfast Municipal Electric Power Station West with the System of the Electricity Board for Northern Ireland at Donegall Sub-Station.
This 110 kV. 3-core cable is the highest voltage 3-core cable of the oil-filled type manufactured in this country.

Consultants: Messrs. Merz & McLellan, Newcastle-upon-Tyne

HENLEY *Specialists in Super-tension Cable Technique*

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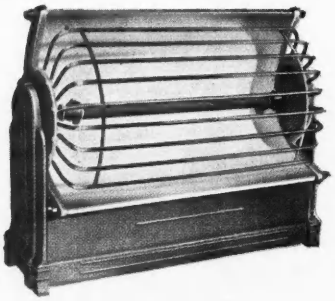
It's **MEM** again for top value in fires and convectors

QUALITY is better than ever in the new season's MEM range. All reflectors are brass, heavily chromium plated. Every fire and convector complies fully with BS 1670. This lays down stringent requirements for insulation, safety clearances, earthing and rust-proofing, thus ensuring complete safety, long life and reliability. You can offer this extra quality in all MEM fires at prices that mean quick, easy sales.

MEM fires are available in a choice of attractive colour finishes.

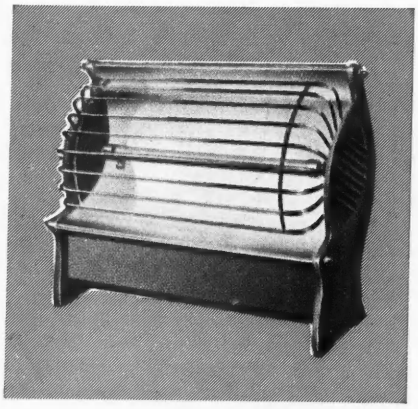
Each fire has a substantial safety guard complying with statutory safety regulations.

Send for new Fire List No 351.



MEMRAY

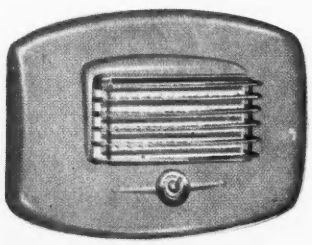
Fine quality swivel reflector fire. Chromium plated brass reflector, efficient guard, robust cast construction. In 1 and 2 kW ratings.



REFLEX

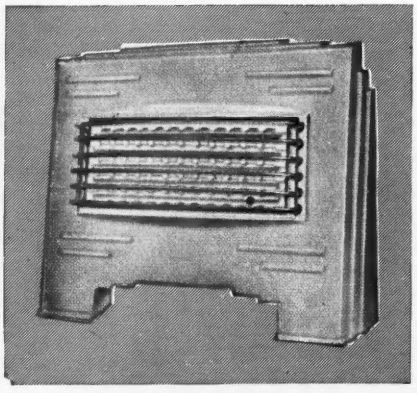
A sturdily built reflector fire offered at an attractive price. Cast iron sides, chromium plated brass reflector. In 1 and 2 kW ratings.

MEMVAIR CONVECTORS. Keep in step with the growing popularity of convectors by giving a prominent place in your showroom to MEMVAIR convectors. Handsome, efficient and absolutely safe. Lovely bronze finish. In three ratings, 1, 1½ and 2 kW with or without thermostat.



PANEL FIRES

Attractive modern designs. The "Walbeam" Outset Flat Bar Pattern is designed for surface mounting. The "Walray" Inset Reflector Pattern is for recessing into wall or surround.



MAYFAIR

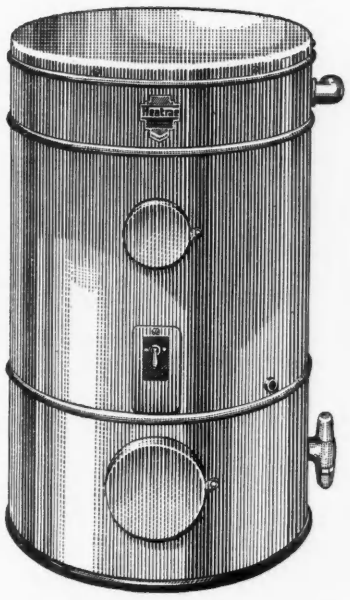
A really well-made bar type fire that will give years of good service. Attractive simple design. Sturdy cast frame. In 1 and 2 kW ratings.

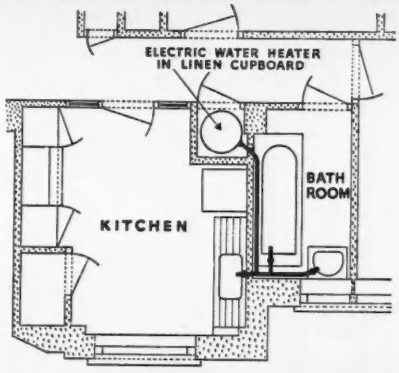
MEM MIDLAND ELECTRIC MANUFACTURING CO. LTD., Tyseley, Birmingham 11. Branches in London and Manchester

Simplicity—The Hallmark of Genius . . .

Heatrae

electric water heaters





The Heatrae Two-Twenty. Nominal water capacity: 20 gallons.

Two banks of removable core heating units, each controlled separately by a thermostat.

All units are interchangeable.

Cable entry and control switch well above floor level.

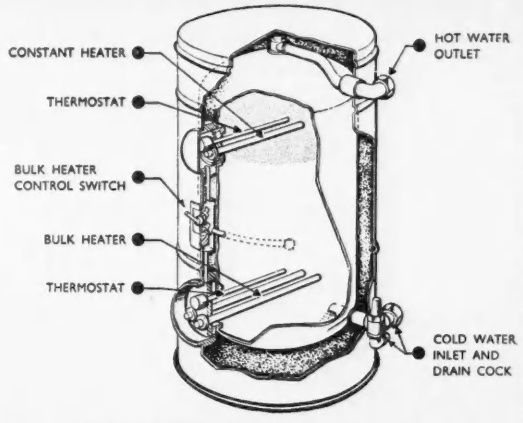
Heatrae Two-Twenty fits easily under the draining-board; or an ideal position for it is in a small cupboard adjacent to the kitchen and bathroom—as shown. The upper part of the cupboard can then be used as an airing chamber so that the very small heat losses from the heater are put to useful account.

There is also a Heatrae One-Twenty—similar to the Two-Twenty except that it has one heat zone only at the bottom, automatically controlled.

The hand switch is unnecessary.

Full details on request.

are so simple . . .



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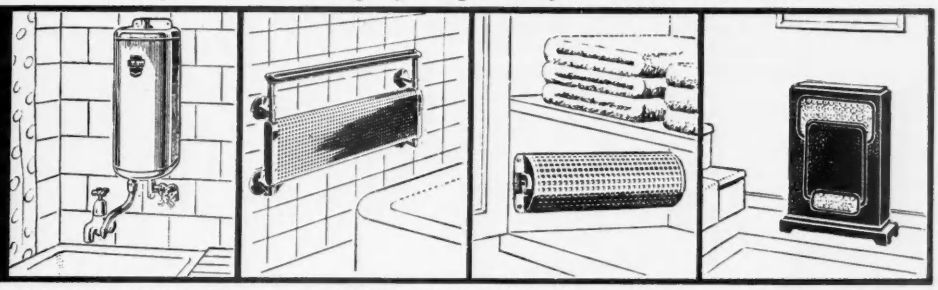

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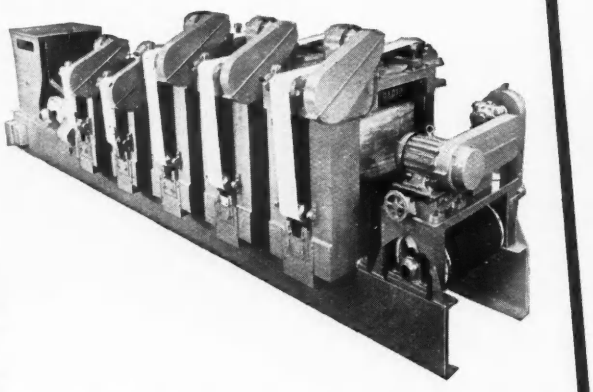
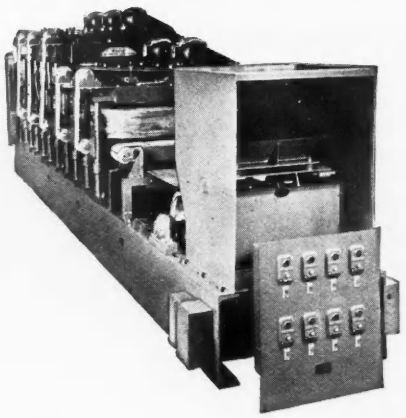
The value of Lewmex Winding Wires has been proved by many years' successful commercial application under the most exacting and difficult conditions.





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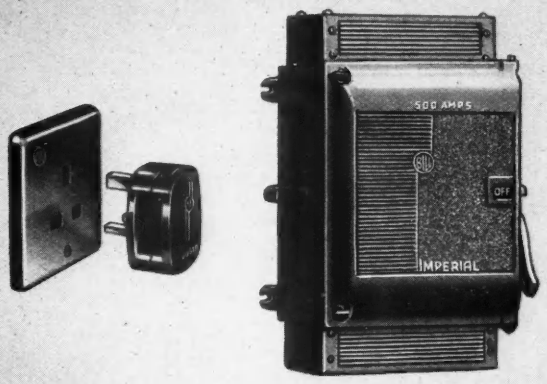

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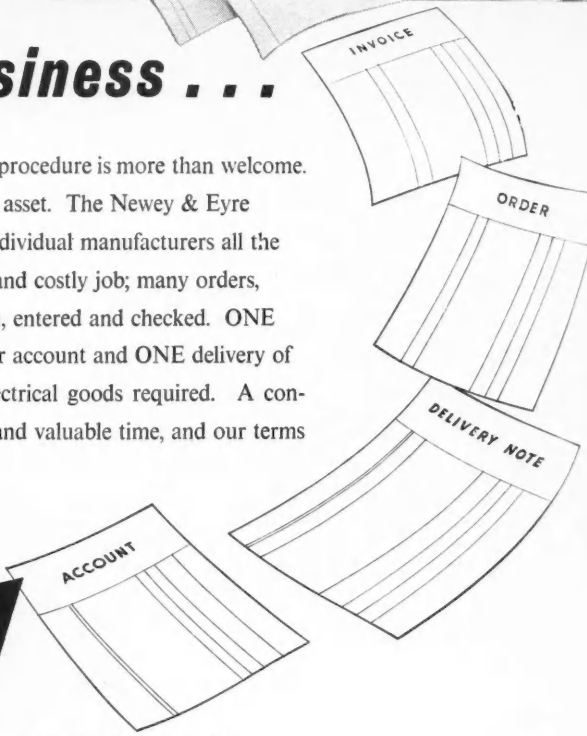

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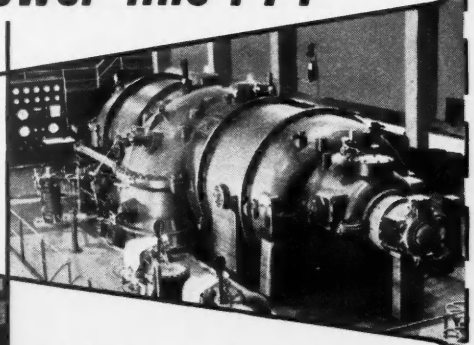

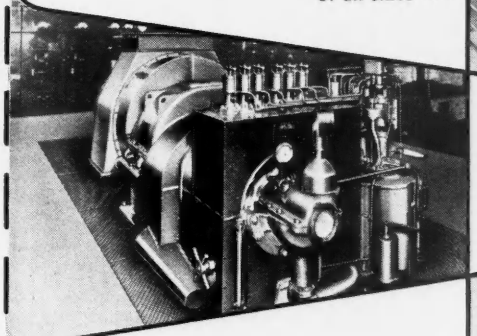

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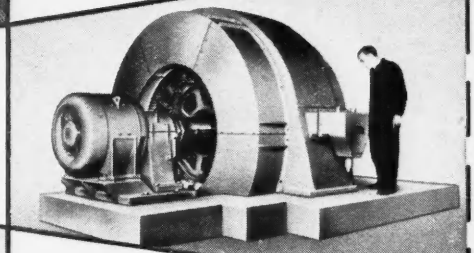

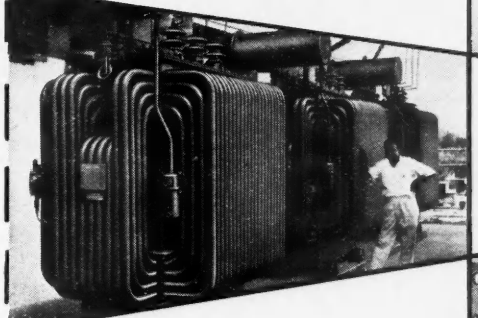

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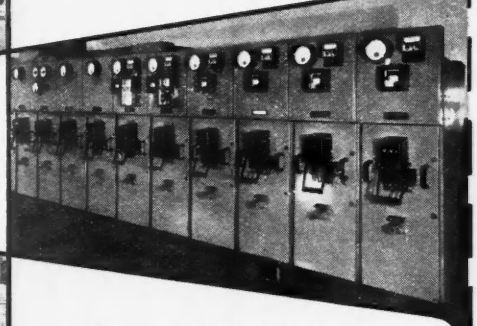

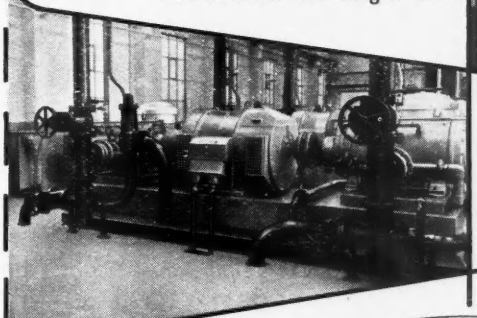

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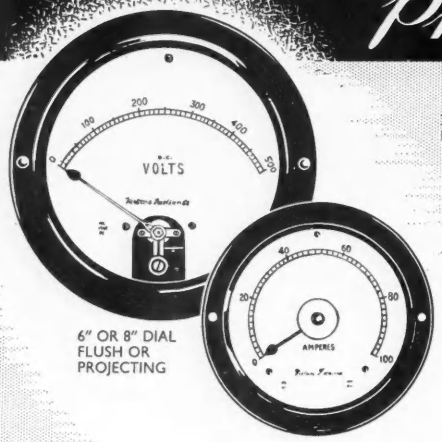

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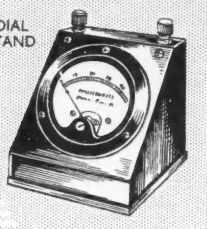

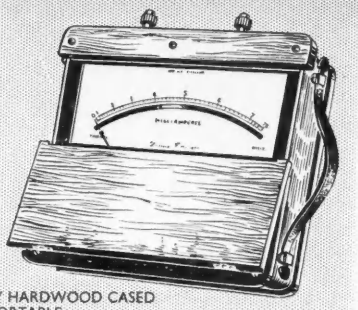

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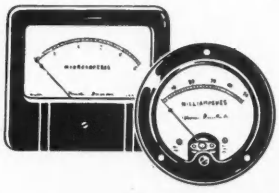

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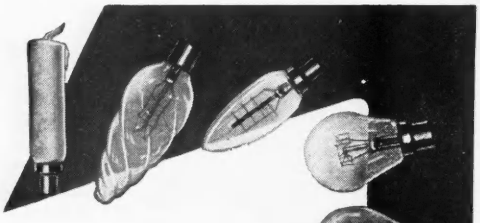

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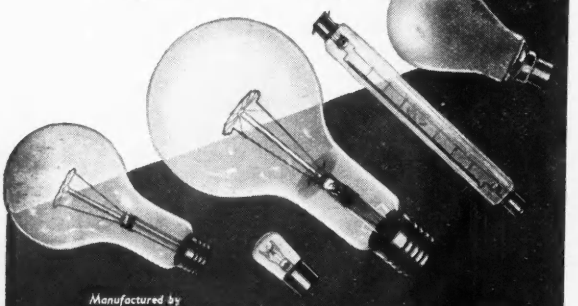

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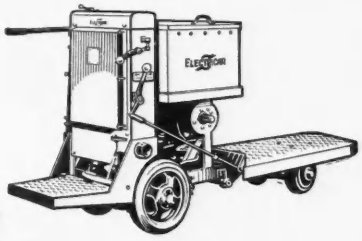

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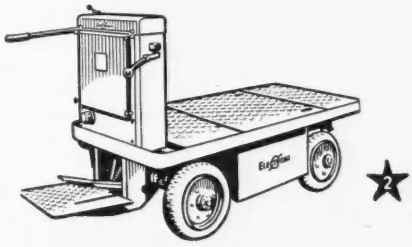
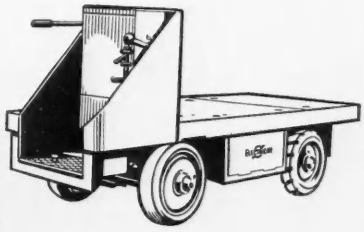


★2

★3



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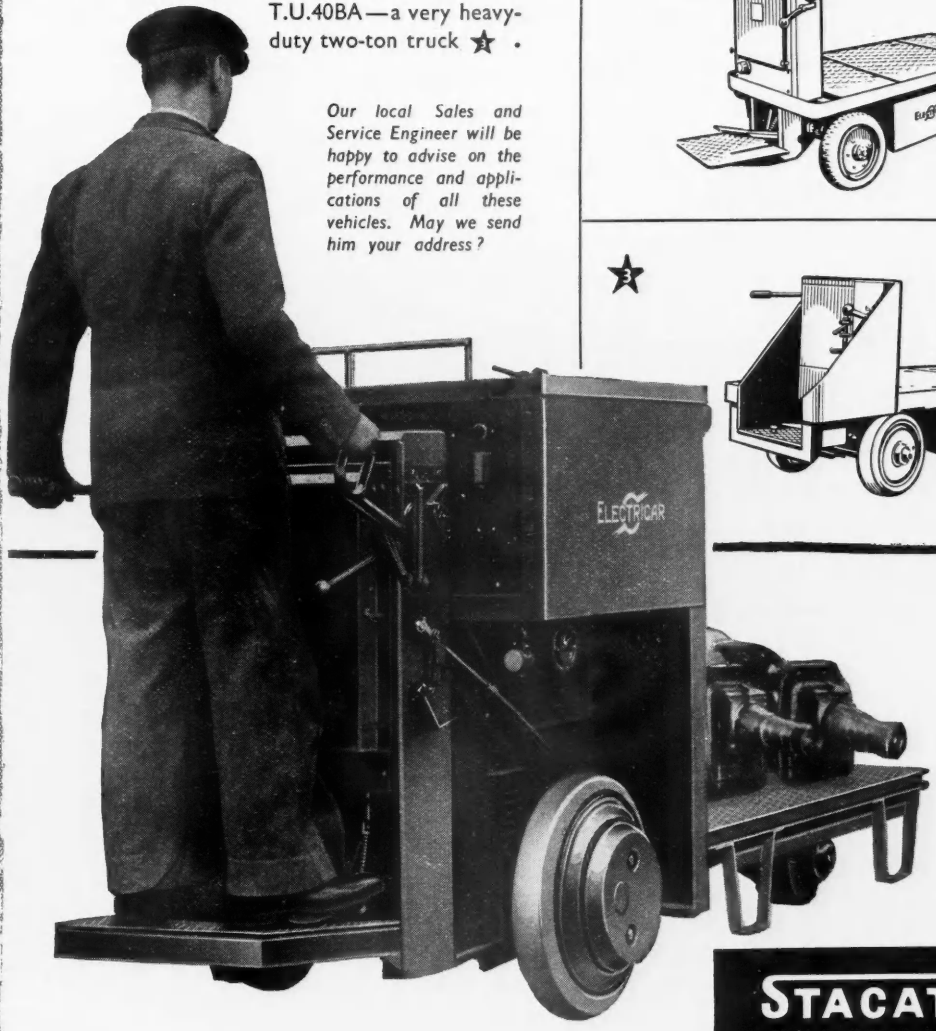

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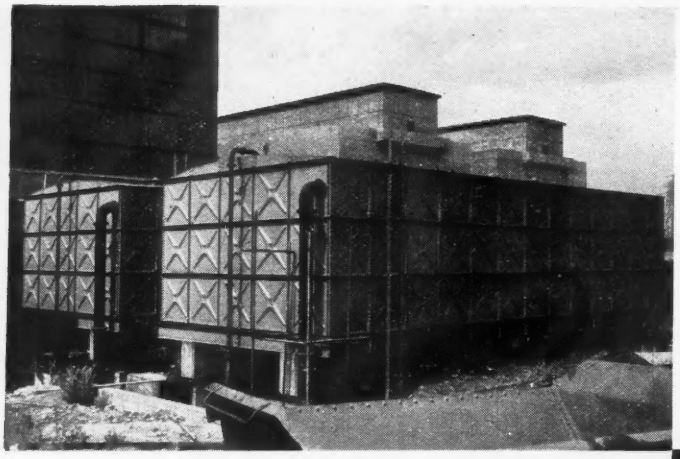

The Braithwaite unit method of construction enables Pressed Steel Tanks to be used for any liquid storage needs. Illustrated are some of the tanks supplied to Aiton and Co. Ltd. for the London Division of the British Electricity Authority at the Barking Generating Station. The Consulting Engineers are Merz and McLellan.

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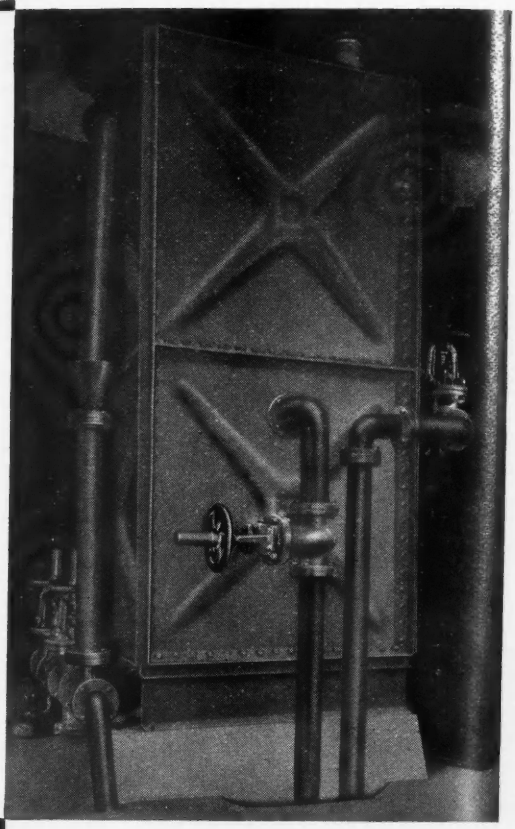

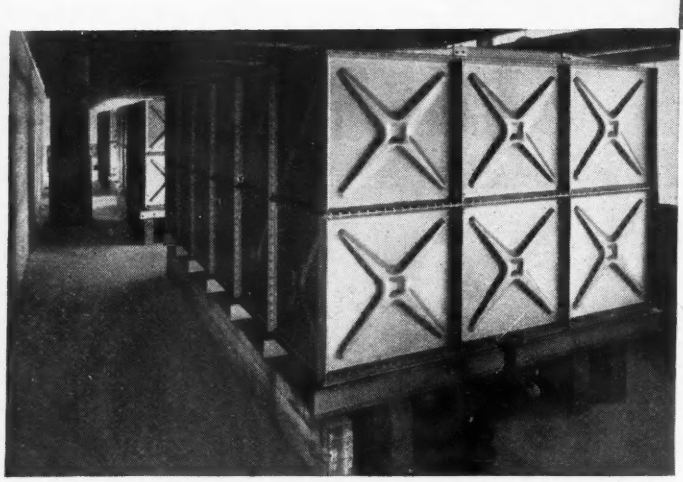

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FIRST.... 100,000 kVA BANK

for GARRISON DAM PROJECT NORTH DAKOTA U.S.A

230 kV, 33,333 kVA Ferranti Transformers

The first three Ferranti single-phase 13.2/230 kV, 33,333 kVA generator transformers for the U.S. Army Corps of Engineers for the Garrison Dam Project, North Dakota, U.S.A. have now been shipped. The contract is for nine 230 kV transformers which will form three 3-phase 100,000 kVA banks.

This modern factory covering approximately 186,000 square feet, has a manufacturing capacity of over 5 million kVA of Large Power Transformers per annum.

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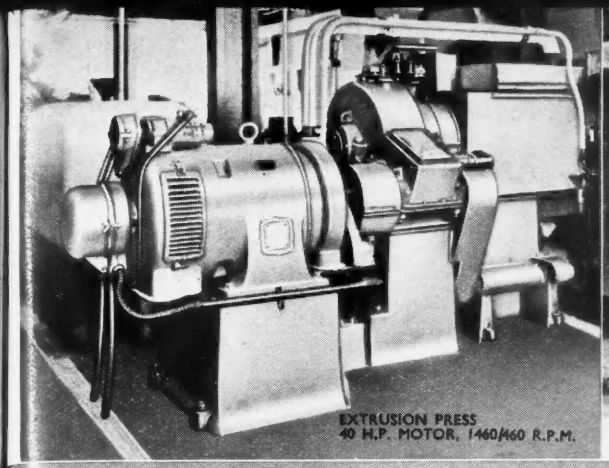
15% MORE LIGHT NOW AVAILABLE from Osram

"NATURAL" Fluorescent Tubes

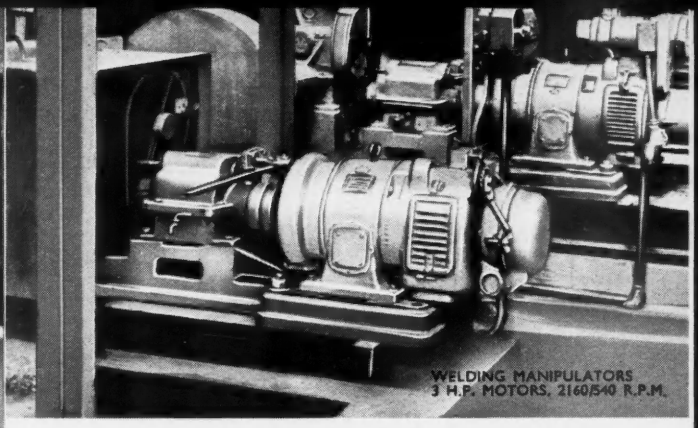
Description		Average Light Output during first 5,000 hours of life (lumens)	
		OLD	**NEW**
5ft	80w	2,720	**3,120**
4ft	40w	1,520	**1,640**

No other fluorescent tube gives more light or lasts longer than Osram

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

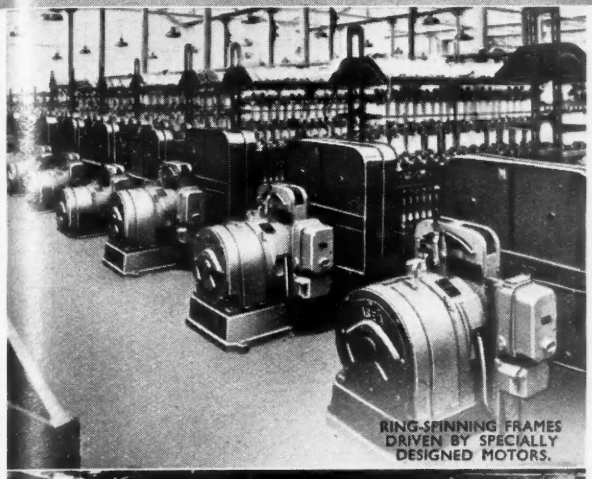


EXTRUSION PRESS
40 H.P. MOTOR, 1460/460 R.P.M.

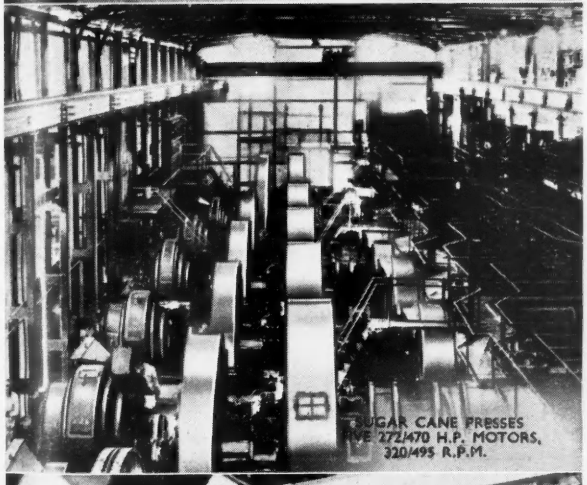


WELDING MANIPULATORS
3 H.P. MOTORS, 2160/540 R.P.M.

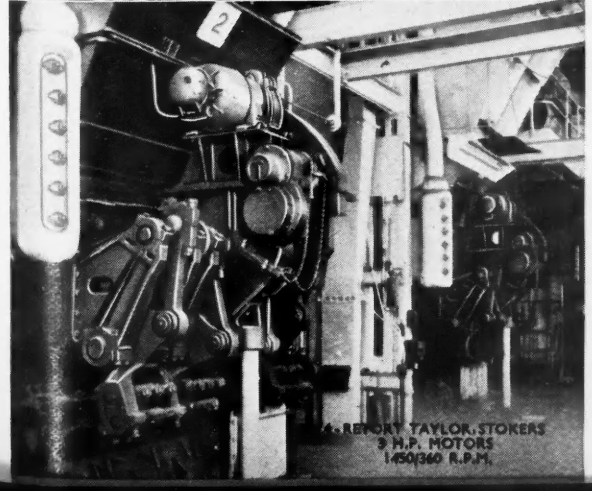
3-PHASE COMMUTATOR MOTORS



RING-SPINNING FRAMES
DRIVEN BY SPECIALLY
DESIGNED MOTORS.



SUGAR CANE PRESSES
FIVE 272/470 H.P. MOTORS,
320/495 R.P.M.



4-REPORT TAYLOR STOKERS
9 H.P. MOTORS
1450/360 R.P.M.

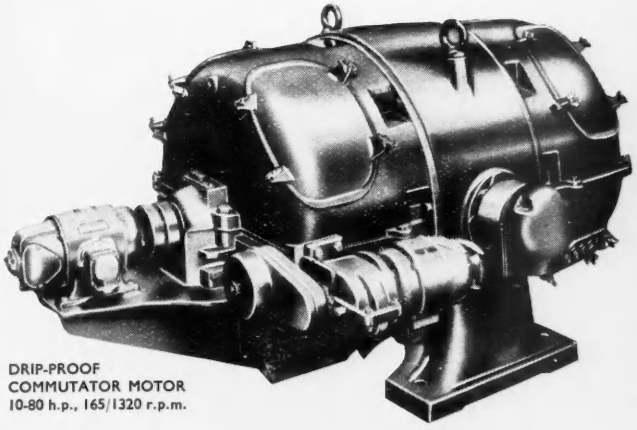
In 1910 ASEA built the first Variable Speed A.C. Commutator Motor with shunt characteristics. The ensuing forty-four years have given us a practical experience without equal in the design and construction of these motors.

The motors are suitable for a great variety of drives in many industries, and in a number of instances special control systems have been developed to bring out the full advantages of the characteristics of the motor.

They are now built in a wide variety of sizes, speed ranges and enclosures. All speed regulation control is within the motor. The standard motor with a 4 to 1 speed range meets most industrial demands but other motors are available with wider infinite speed variation up to 0 to 3,000 r.p.m. at certain outputs. In the race for increased production the advantage of installing our Variable Speed Motors cannot be ignored.

Send for literature today to tell you more of the benefits to be obtained by using these motors.

Prompt delivery of certain sizes can now be offered.



DRIP-PROOF
COMMUTATOR MOTOR
10-80 h.p., 165/1320 r.p.m.

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THE CASE OF THE 15 BOTTLENECKS

Up and up went the demand for their bottled beer. More orders to be analysed, more ledgers to be posted. In the offices of the famous brewers it was a case of "time, gentlemen, please."

Father William wanted them "cleared" fast

CHEERFUL SYMBOL of the great brewers, William Younger & Co. Ltd., Edinburgh, Father William had a problem. The country was drinking far more *bottled* beers. Orders from Customers and from their own houses poured in for the fifteen different lines of bottled ales and stouts they brew. With so many invoices to deal with, each with several lines to be posted and analysed, over and above the normal volume of Bulk Ale sales, the office departments were hard pressed to produce the up-to-the-minute sales figures the company needed.

Younger's asked Burroughs for suggestions, and after considering various other methods of handling this detailed analysis, they decided to install Burroughs Electric Duplex Calculators for the "analysis of ales and stouts" operation.

Then, seeking to speed their already mechanized Sales Ledger posting, they went to Burroughs again, and installed Burroughs High Speed Accounting Machines for *that* work also.

Result: Invoice checking, extension and analysis with the Burroughs Calculators now goes so smoothly that Younger's management can rely on comprehensive sales-figures in plenty of time to relate production to public demand. They find, too, that flexible Burroughs Accounting Machines can cope with a greatly increased volume of daily posting to "Bulk" Ledger or "Bottled" Ledger. Father William is a happy man!

Seen demonstrating a Burroughs Duplex Calculator in the offices of William Younger & Co. Ltd. is Burroughs representative Mr. M. Jolly. This fast, two-answer-dials calculator is one of the machines that helped to solve the Case of the 15 Bottlenecks.

What about you? If your business could benefit from faster, accurate figuring, call in Burroughs. They can offer advice on all the latest systems, for Burroughs market the world's broadest line of modern record-keeping machines: Adding, Calculating, Accounting, Billing and Statistical Machines, and Microfilming Equipment. Remember, once you have any Burroughs machine, Burroughs Service *guarantees* its efficiency in operation.

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May we have your enquiries for:—

Paper Insulated Cables, all types up to and including 22,000 volts

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V.I.R. Taped, braided and compounded to BSS 7/1953

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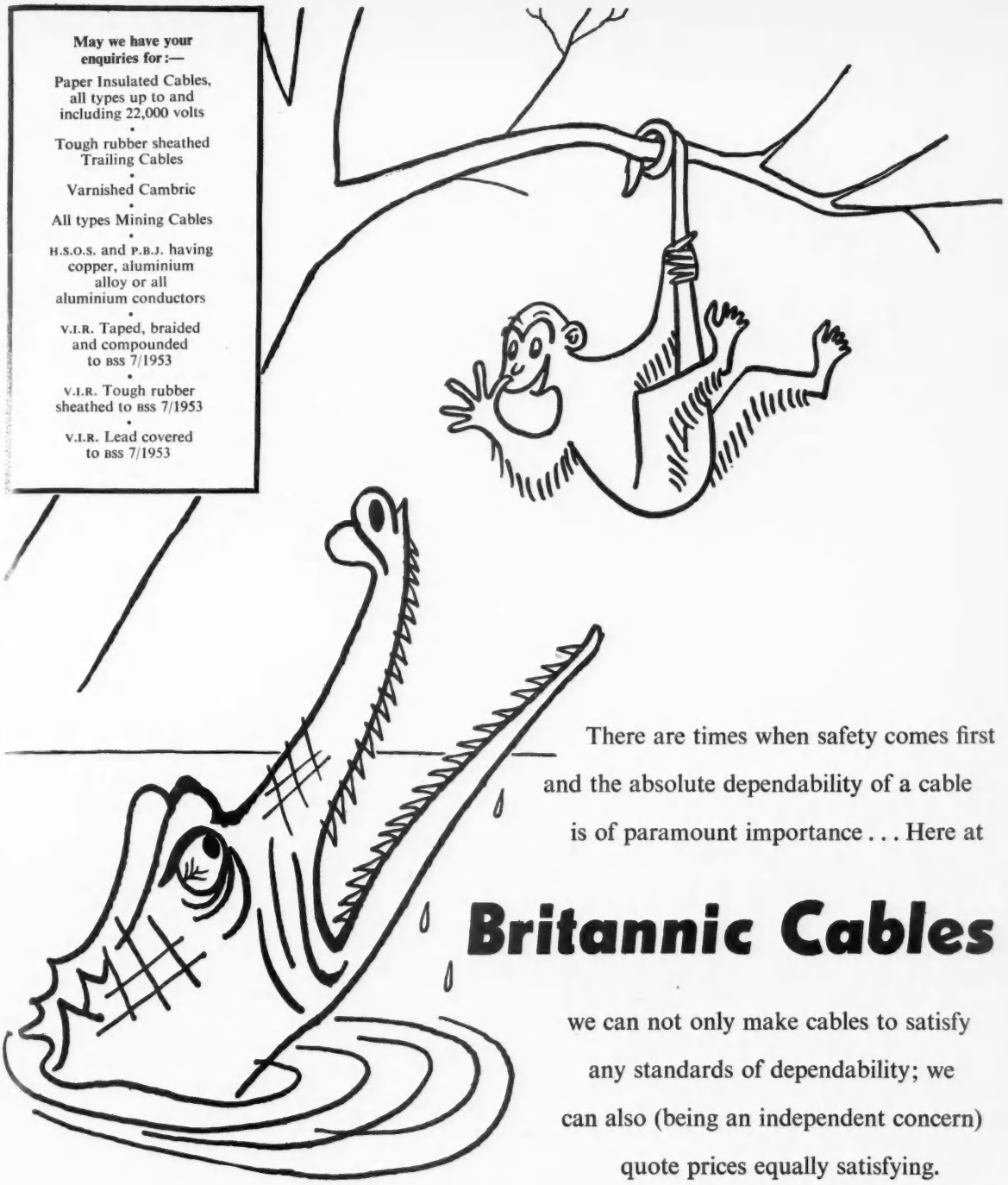

There are times when safety comes first and the absolute dependability of a cable is of paramount importance . . . Here at

Britannic Cables

we can not only make cables to satisfy any standards of dependability; we can also (being an independent concern) quote prices equally satisfying.

Britannic Cables carry the load

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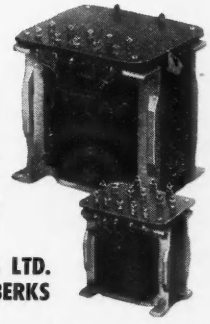
RANGES from small ELECTRONIC TYPES, up to 50 kVA, orthodox and C cores. 1 PHASE and 3 PHASE OIL and AIR COOLED PHASE CONVERSION, etc.

Special Types for **FURNACE** *and* **RECTIFIER CONTROL**



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RADIO HEATERS LTD. WOKINGHAM, BERKS

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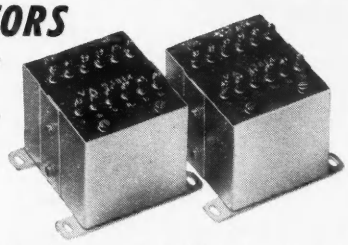
TRANSDUCTORS

AS MANUFACTURED FOR:
THE ENGLISH ELECTRIC CO. LTD.



The WESTMINSTER ENG. Co. Ltd.

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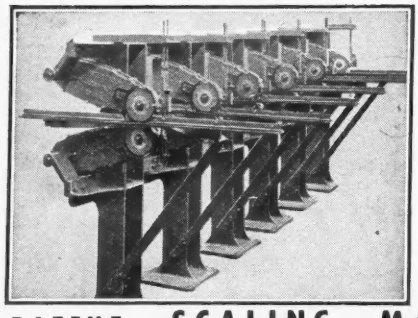
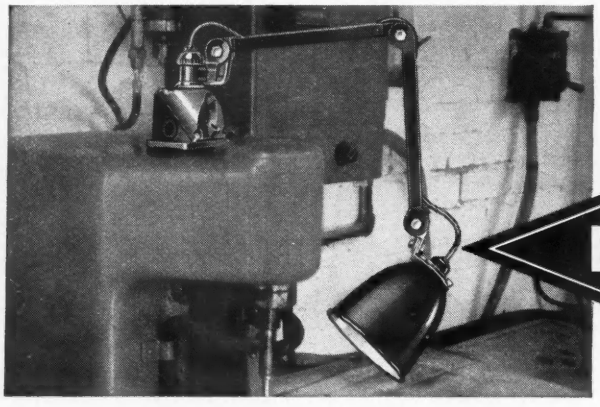
Telephone: ELGar 7372 (2 lines)



For removing the scale from 2 surfaces on one edge of plate simultaneously, preparatory to welding.

A batch of single-ended Pedestal Type

PATENT SCALING MACHINES



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INDUSTRIAL LOCAL LIGHTING

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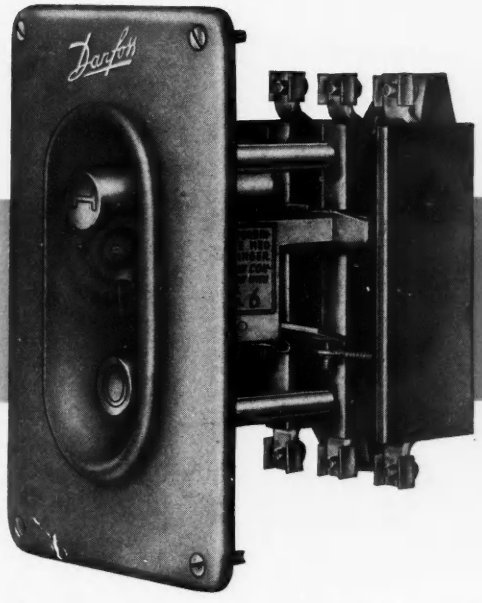
THE Danfoss MANUAL DIRECT STARTER

TYPE 3

GENERAL-PURPOSE
MILD STEEL
WALL-MOUNTING

Here are our reasons for recommending this starter:



Vibration-resistant snap-action switch mechanism
Trip-free
Overload-trips in all three phases
Seven relays cover the range from 0.2 to 15 amps.
Double-break silver contacts
Ample screenings and spacings
Readily accessible clamp-type terminals

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Please write for leaflet Z 33-140 which gives detailed information

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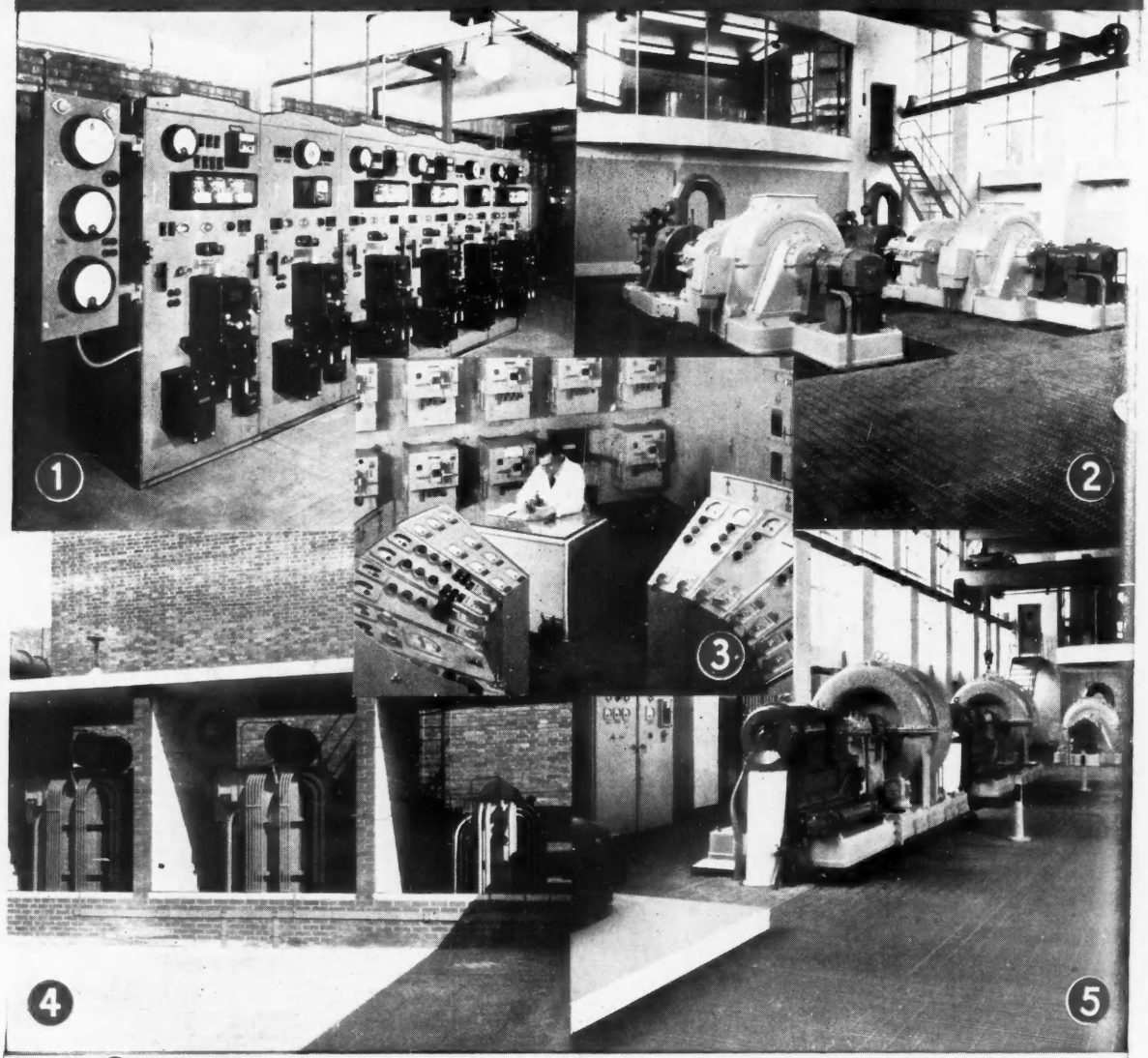

1 TRUCK TYPE L.T. MAIN SWITCHGEAR, REMOTELY CONTROLLED
2 BACK PRESSURE TURBO-ALTERNATORS, 1750 kVA CAPACITY
3 WITHDRAWABLE TYPE DISTRIBUTION SWITCHGEAR AND CONTROL DESK
4 POWER TRANSFORMERS—4000 kVA TOTAL CAPACITY
5 EXHAUSTER MOTORS

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J. E. WAKEFORD ESQ., M.B.E., M.INST.GAS E., M.INST.F., DIVISIONAL GENERAL MANAGER.

ESTABLISHED 1882

THE ELECTRIC CONSTRUCTION COMPANY LTD.

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The HOUSE of STONE
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We can supply YOU with
Everything Electrical –
from a Reyrolle Plug to a 15 ton Aabacas Hoist

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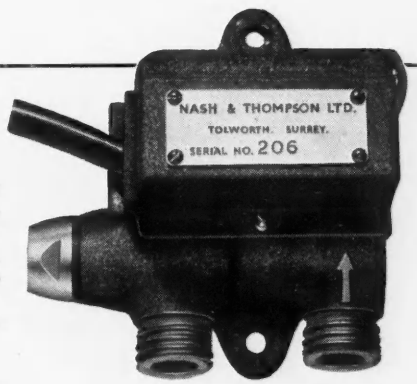
24 hours a day . . . .

FLOW CONTROLLED SWITCHES



Protect your equipment with a Nash & Thompson Flow Controlled Switch. This device can be used for a number of purposes, such as the prevention of over-heating in liquid cooling circuits or the automatic starting and stopping of pumping machinery when the liquid flow falls below or rises above limiting values.

These Switches make or break an electrical circuit when liquid flow moves outside preset limits. Three models are offered covering operative flows from 0.25 to 30 gallons per minute. They are robustly constructed, simple to install and maintain and trouble-free in operation. If desired they can be supplied flame-proof to Buxton Certificate standard for gas groups 1, 2 and 3.

Descriptive literature sent on request.

Nash and Thompson
LIMITED

OAKCROFT ROAD • TOLWORTH • SURREY • ELMBRIDGE 5252

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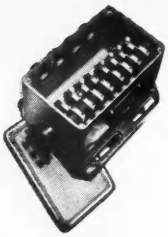
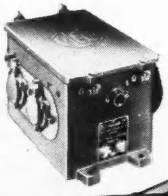


LIMIT SWITCHES

Compact and reliable chain and hand operated limit switches are designed for all industrial purposes.

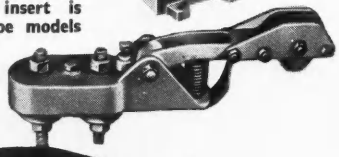
CENTRIFUGAL SWITCHES

Specially developed for conveying plants, hoists and similar equipment, also for automatic safety devices.



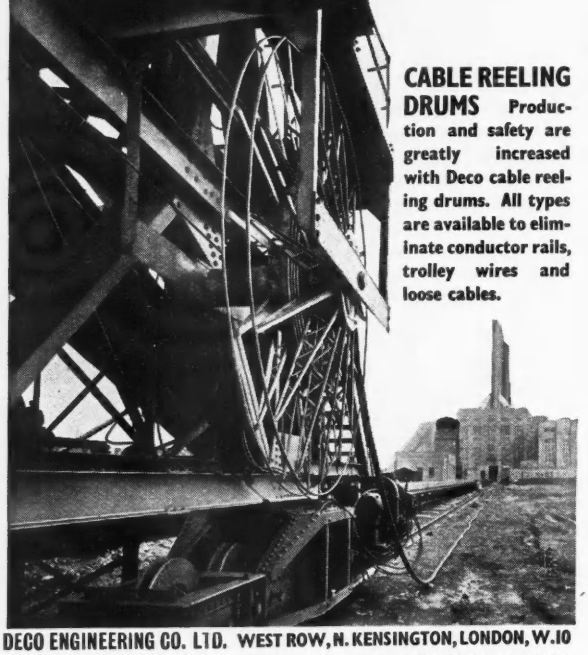
SLIPPER COLLECTORS

A single shoe model with a renewable 3 face carbon insert is illustrated. Double shoe models are also available.



DECO

electrical products for industry



CABLE REELING DRUMS Production and safety are greatly increased with Deco cable reeling drums. All types are available to eliminate conductor rails, trolley wires and loose cables.

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Tel: LADBROKE 3066-7 (2 lines) Grams: ETYLADEC, WESPHONE, LONDON

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METWAY PRODUCTS

Registered Trade Mark

ORDER *NOW* FOR THE COMING SEASON

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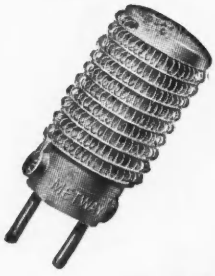

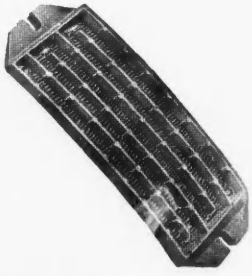

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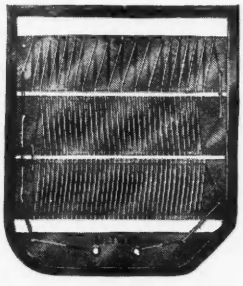

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METWAY WORKS

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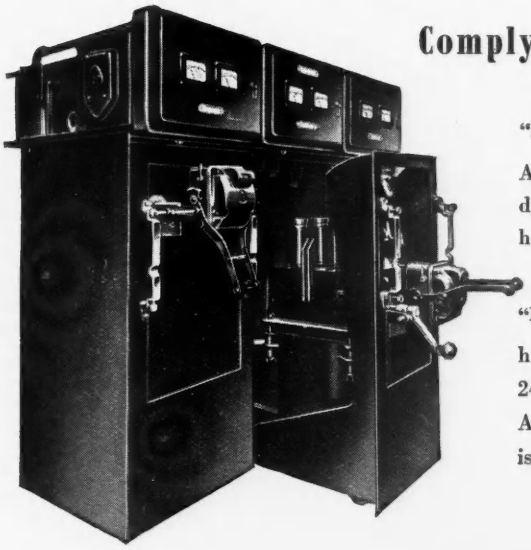
A.S.T.A. TESTED SWITCHGEAR

Complying with B.S. 116: 1952

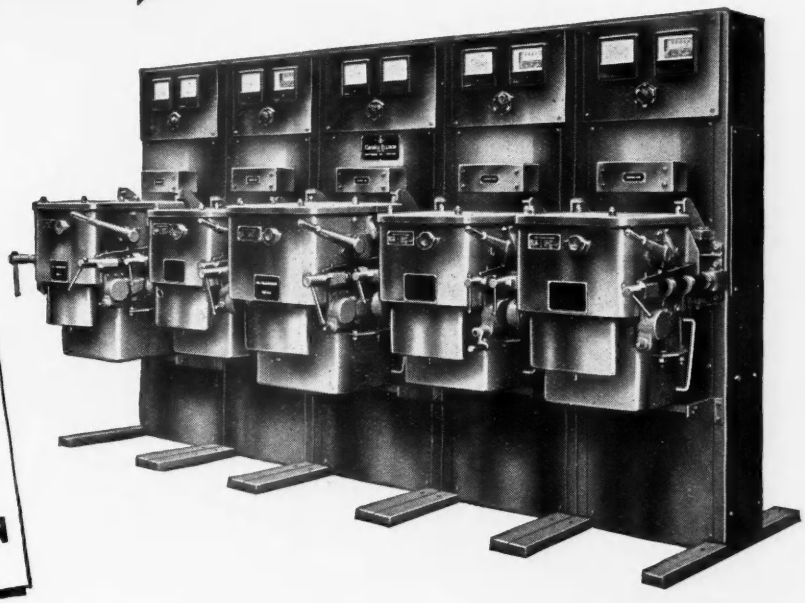


"ELLISON" 11kV. 250 M.V.A. SWITCHGEAR

Arrangements include vertical isolation, arc control devices, flush mounted instruments and closing by hand, spring or solenoid.

"ELLISON" 660 VOLT DISTRIBUTION SWITCHBOARDS

have circuit breakers in current rating sizes of up to 2400 amps and 45 M.V.A. rated breaking capacity. Arrangements include slide rails to facilitate easy isolation and flush mounted instruments.



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YOU CAN RELY ON AN ELLISON PRODUCT

Regd. Trade Mark

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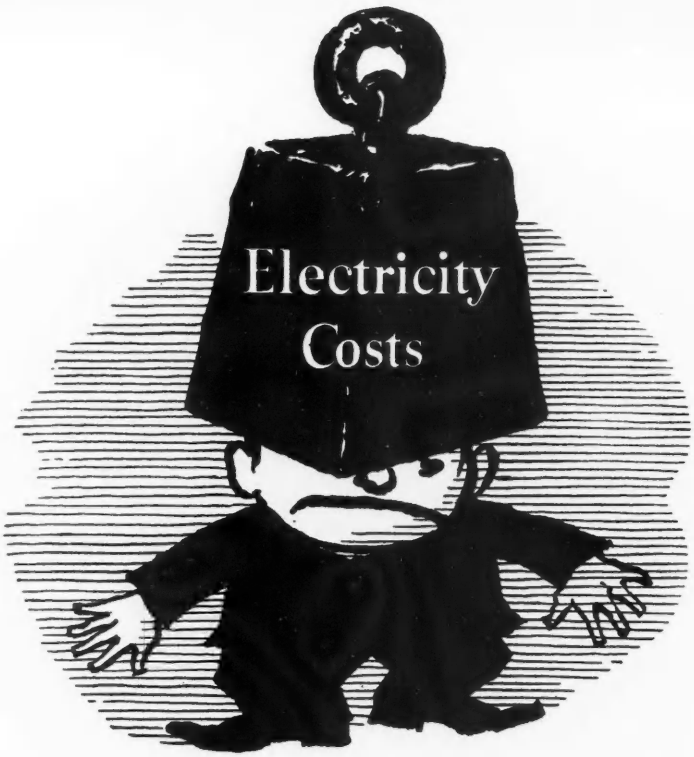

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Save on your electricity costs with

Power Factor Correction Capacitors

The installation of Dubilier Capacitors for power factor correction, effects such substantial saving in cost of power that the capital outlay is recovered in a short period of time. Occupying minimum floor space and requiring no maintenance, Dubilier Power Factor Correction Capacitors are absolutely reliable. Is there room for such improvement in *your* factory? Our engineers will carry out a full investigation of your present power factor and advise you without cost or obligation.

A small factory installed a Dubilier Capacitor to correct their power factor from 0.68 to 0.95, thus reducing their maximum demand from 28kVA to 20kVA.

Cost of Power

	£	s.	d
Before installing Capacitor ...	276	12	0
After installing Capacitor ...	228	12	0
Saving per annum	**48**	**0**	**0**

Approximate cost of Capacitor equipment £65.0.0 *thus paying for itself in little over a year.*

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DUCON WORKS, VICTORIA ROAD, NORTH ACTON, LONDON, W.3.
Phone: Acorn 2241 (5 lines). Grams: Hivoltcon, Wesphone, London. Cables: Hivoltcon, London, Marconi Inter. Code

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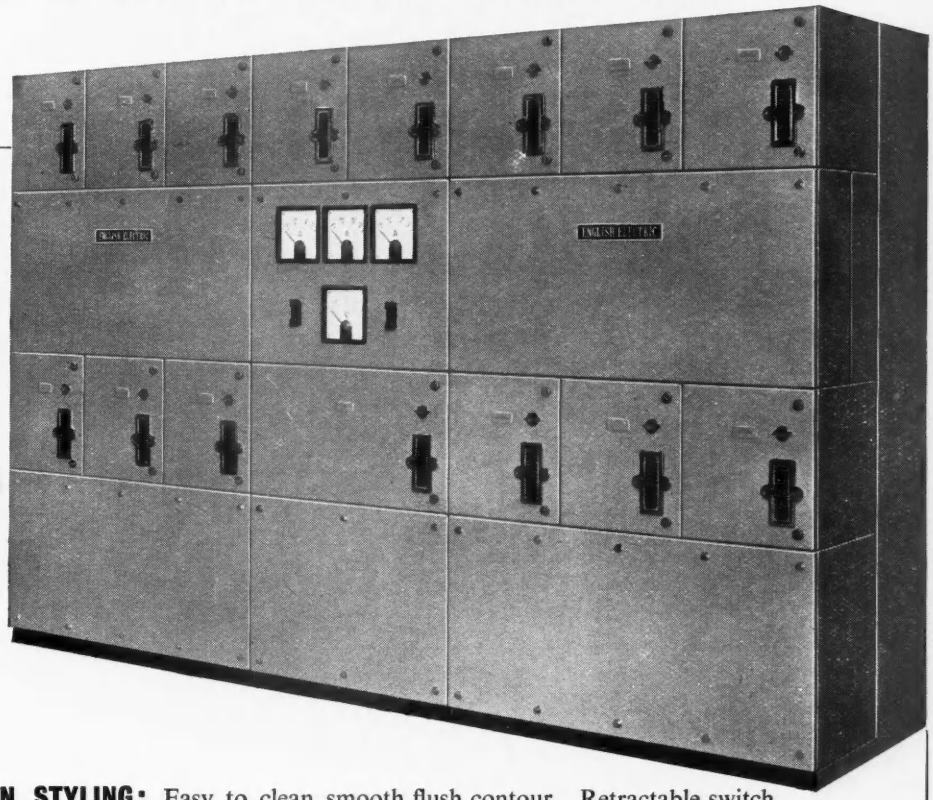
'Superform' fuse switchboards

for the control of MEDIUM VOLTAGE circuits



Incorporating H.R.C. CHASSIS TYPE FUSE-SWITCHES in ratings up to 750 amps.

MODERN STYLING: Easy to clean smooth flush contour. Retractable switch operating handles.

SAFETY FEATURES: Busbars, connections and terminals fully insulated. Potential circuits fused at supply point. Integral cylinder locks fitted to fuse-switches.

PERFORMANCE: Fuse-switches proved for making capacity on 50 MVA. at 440 volts, 3-phase, 50 cycles.

ACCESSIBILITY: Hinged instrument panels give ready access to instruments, terminal boards and small wiring.

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fusegear

THE ENGLISH ELECTRIC COMPANY LIMITED, QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

Fusegear Works, East Lancashire Road, Liverpool, 10

WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON

F.18G4

POWER DISTRIBUTION TRANSFORMERS

The Woden Transformer Co. Limited, design and manufacture all standard transformers up to 750 kVA, for power house, sub-station and distribution purposes. Special types are also made, e.g., Furnace Transformers, Auto Transformers, Rectifier Transformers and Static Balancers

Illustration left: 750 kVA outdoor distribution Transformer

T. I.
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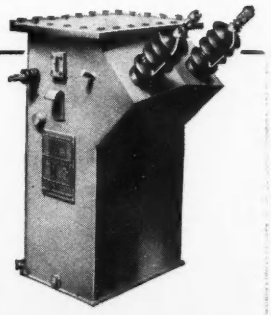

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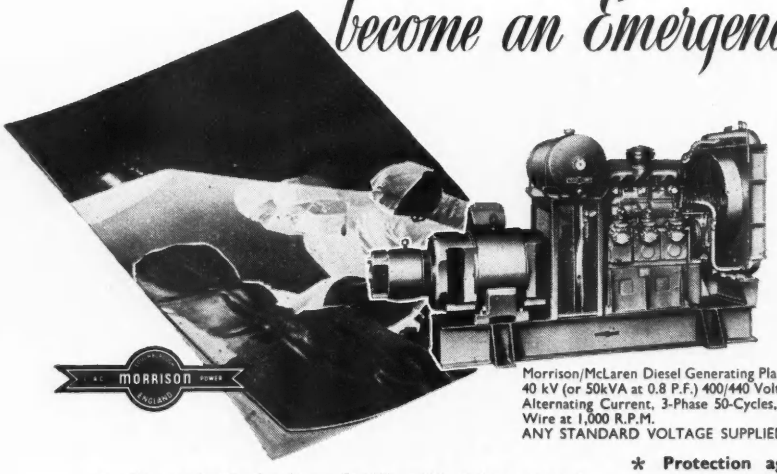

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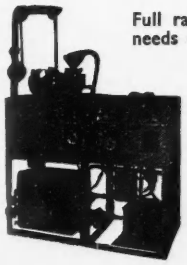

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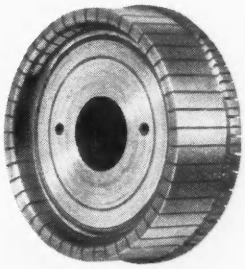

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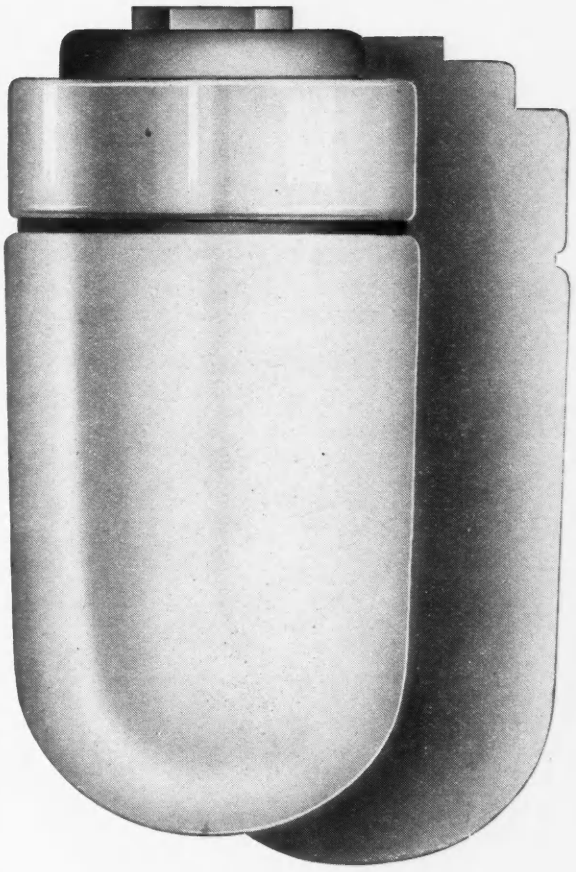

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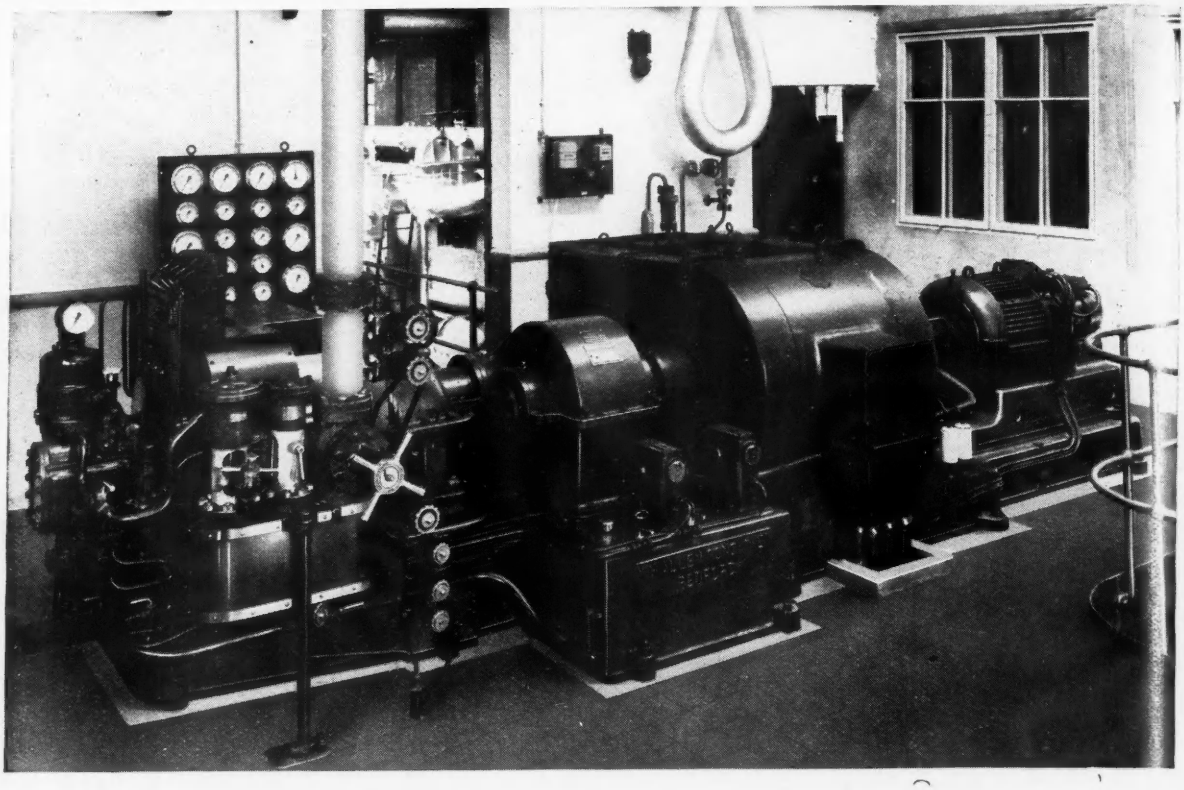

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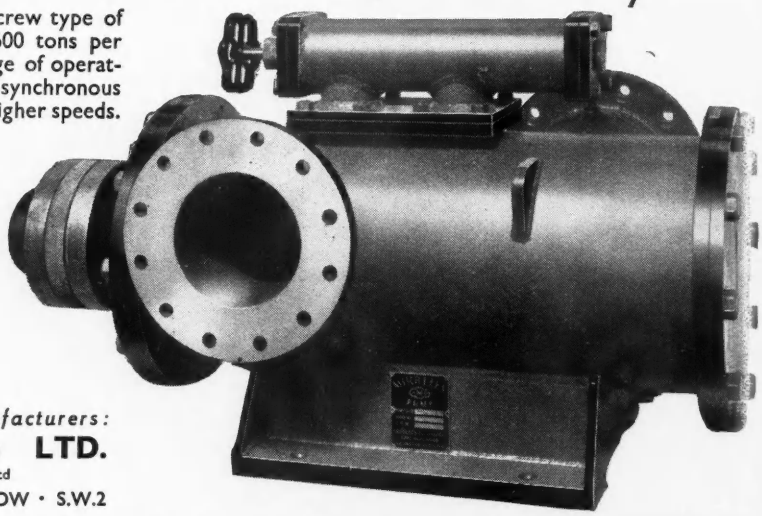

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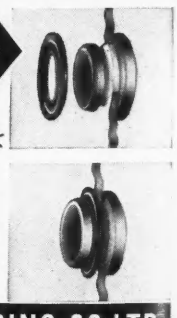

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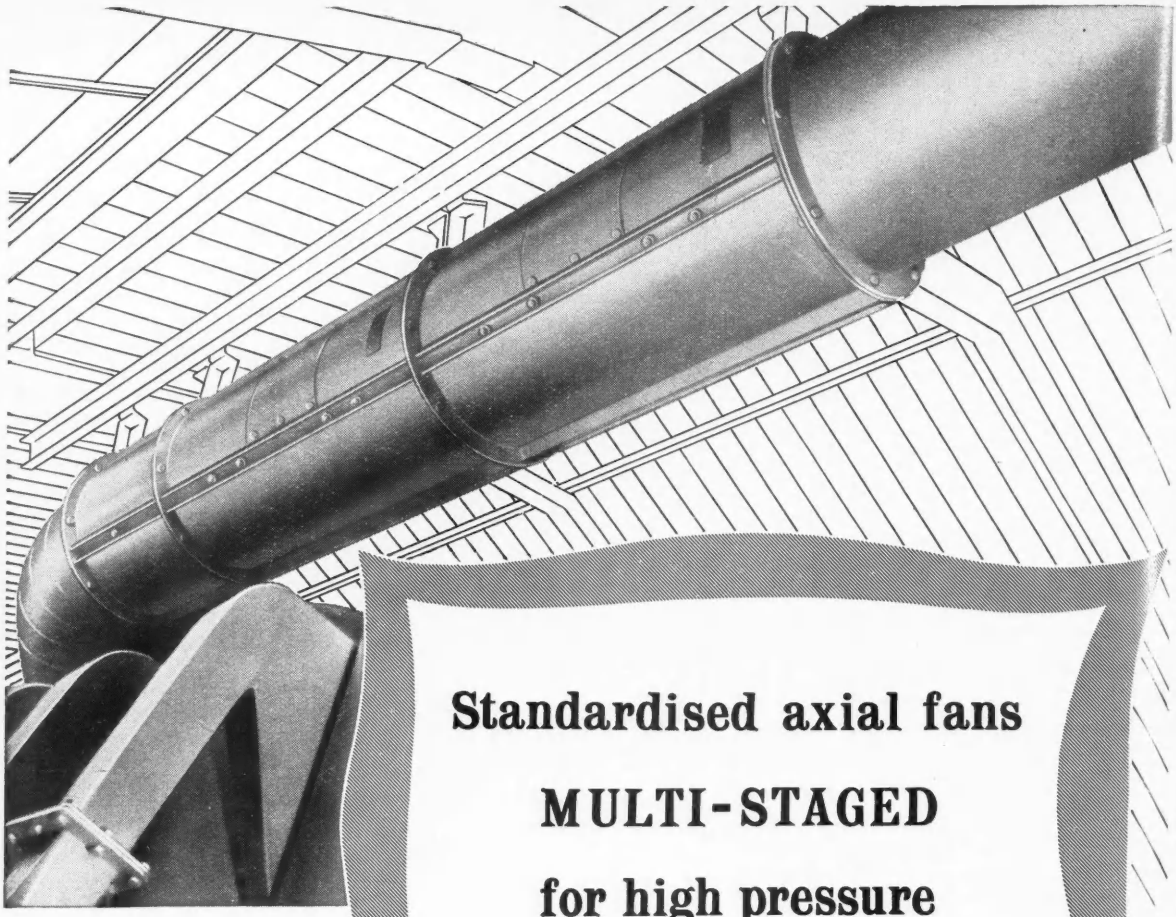

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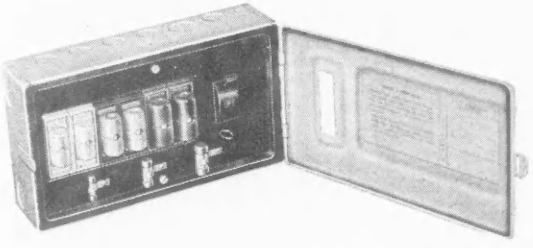

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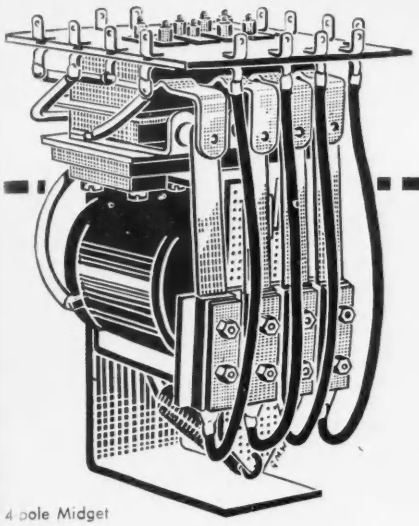

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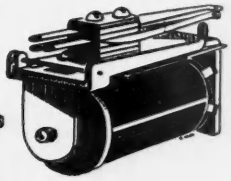

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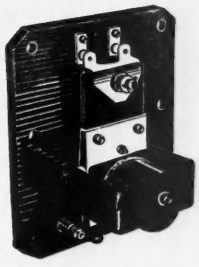

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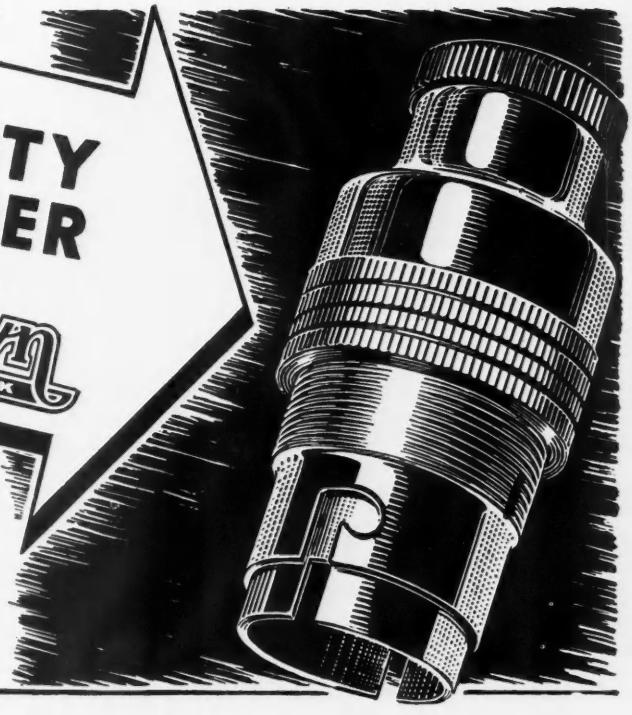

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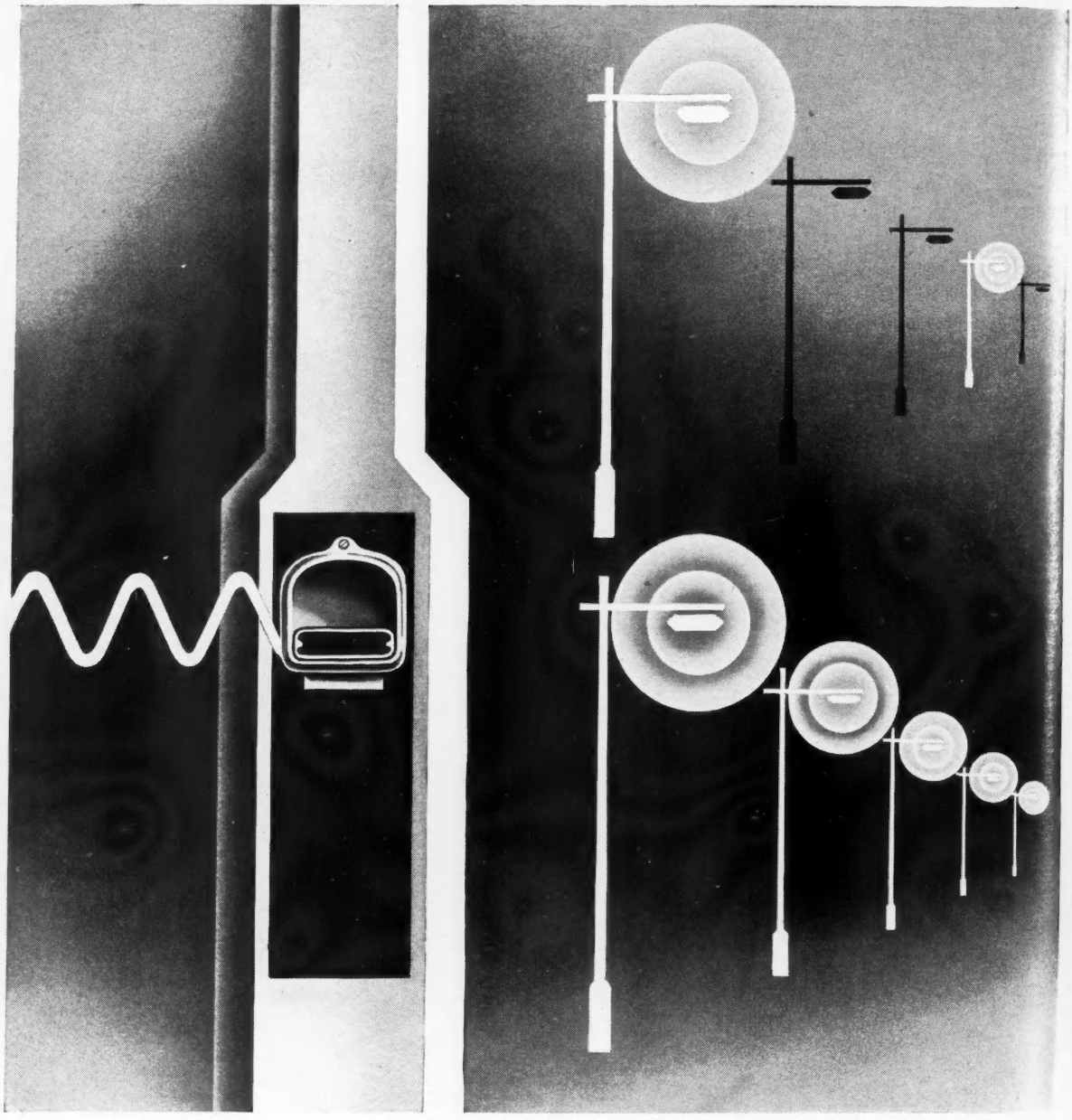

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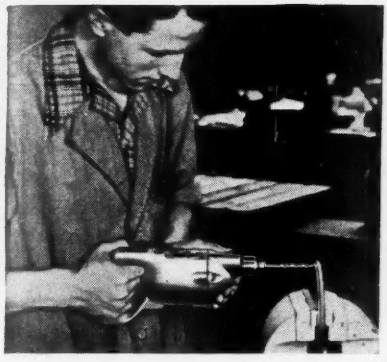

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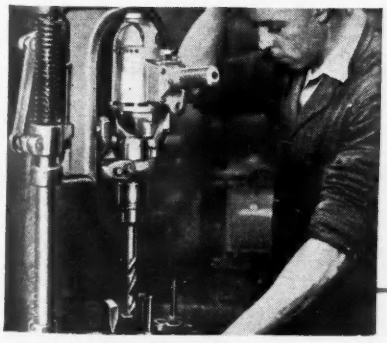

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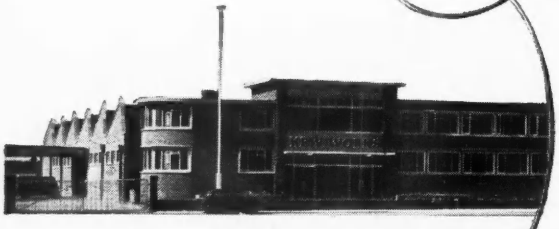

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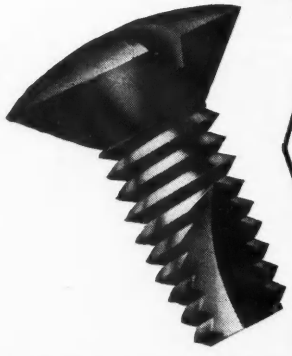

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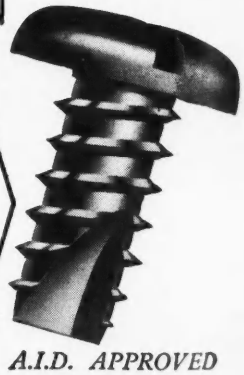

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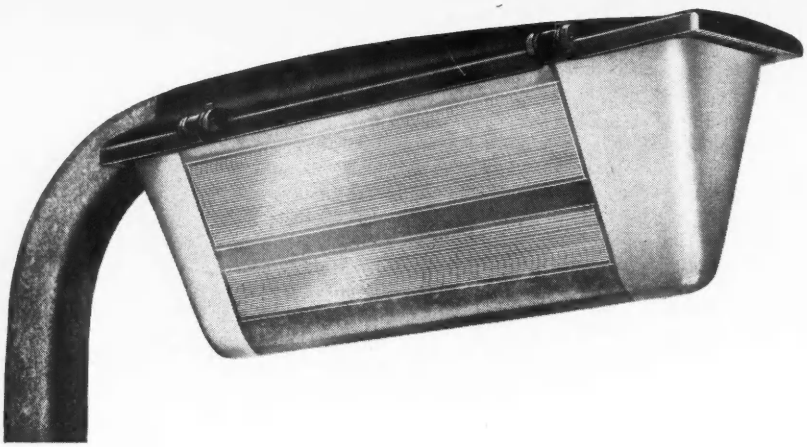

Good lighting-good looking

By night, the Ediswan FSB. 240 Street Lighting Lantern provides high efficiency lighting with acceptable colour rendering for Residential Areas. By day, its clean, simple lines comply with the latest requirements for contemporary Street Lighting Furniture.

The FSB.240 is a totally enclosed plate refractor lantern for group "B" street lighting using two 2ft. 40 watt fluorescent lamps. The body of the lantern is cast in corrosion resisting silicon aluminium alloy. The "Perspex" bowl, with clear sides and opalised ends, is hinged to the body and held against a special gasket by a stainless steel support. It is secured by quick-release toggle catches. Light distribution is controlled by two machine-cut "Perspex" refractor plates sealed to the inside of the bowl. The Instant Start control gear and lampholders are mounted directly to a gear tray which also acts as a reflector. By loosening four screws in key-hole slots the reflector with gear and lampholders attached can be removed as a complete unit without disturbing the lantern.

The Ediswan FSB. 240 has been accepted by The Council of Industrial Design for inclusion in Design Review.

After exhaustive testing Crawley Development Corporation have selected the Ediswan FSB.240 for Crawley New Town. A feature of these tests were the G.P.O. Radio Interference measurements on lanterns erected in Crawley. The results were summarised by the G.P.O. as follows:—"From the above observations it would appear that the Ediswan installations tested at Crawley New Town do not cause radio interference to local broadcast reception. The interference from these lamps peaked at 370-400 Kc/s and fell rapidly either side of this frequency. It is therefore unlikely to affect the reception of any English station".

As used by Crawley New Town

EDISWAN

Contemporary Street Lighting

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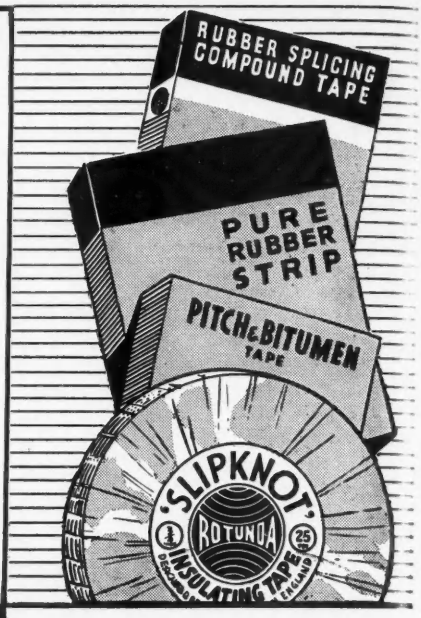

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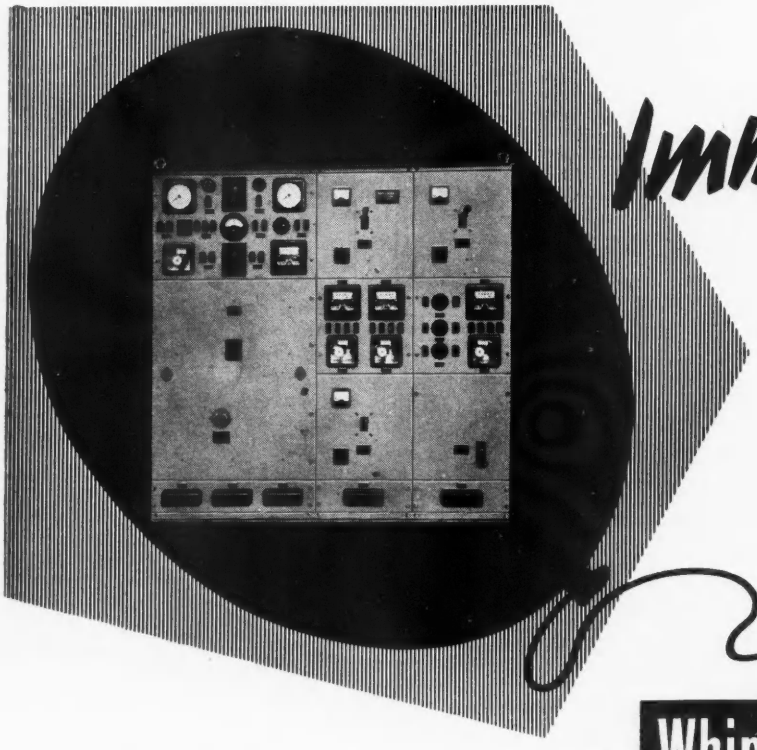

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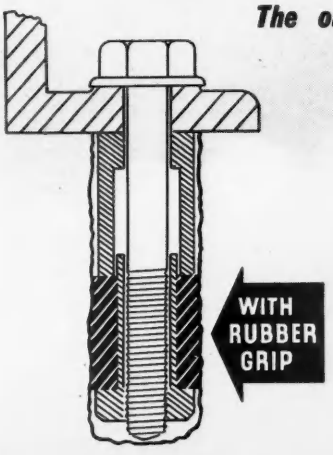

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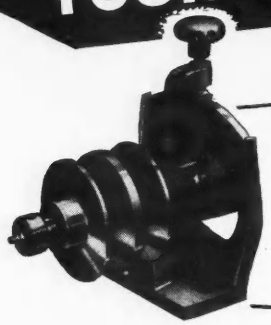

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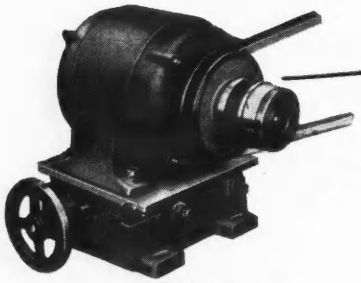

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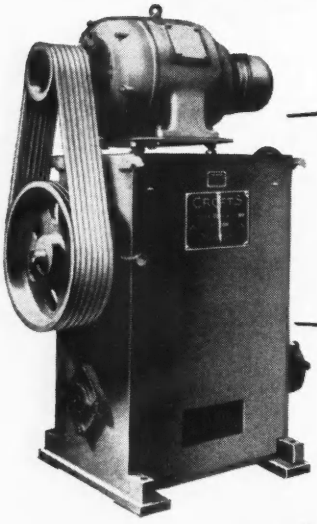

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You can be sure of complete satisfaction from Rists T.R.S. and V.I.R. house wiring cables. Manufacturers of Cables for internal maintenance wiring, electric fans, soldering irons, welding and trailing purposes, switchboard panel wiring, stove wiring and generally for all industrial uses.

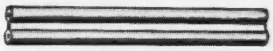
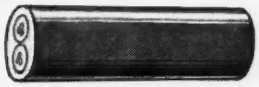
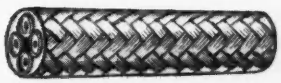


Fig. 8 section flexibles in P.V.C., or rubber insulation

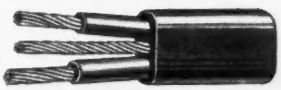

P.V.C. Insulated Cables

V.I.R. or P.V.C. lead in wires or connecting wires

Twin twisted P.V.C. flexible cords


Metal braided flexible cords

Twin twisted cottoned or silk braided cords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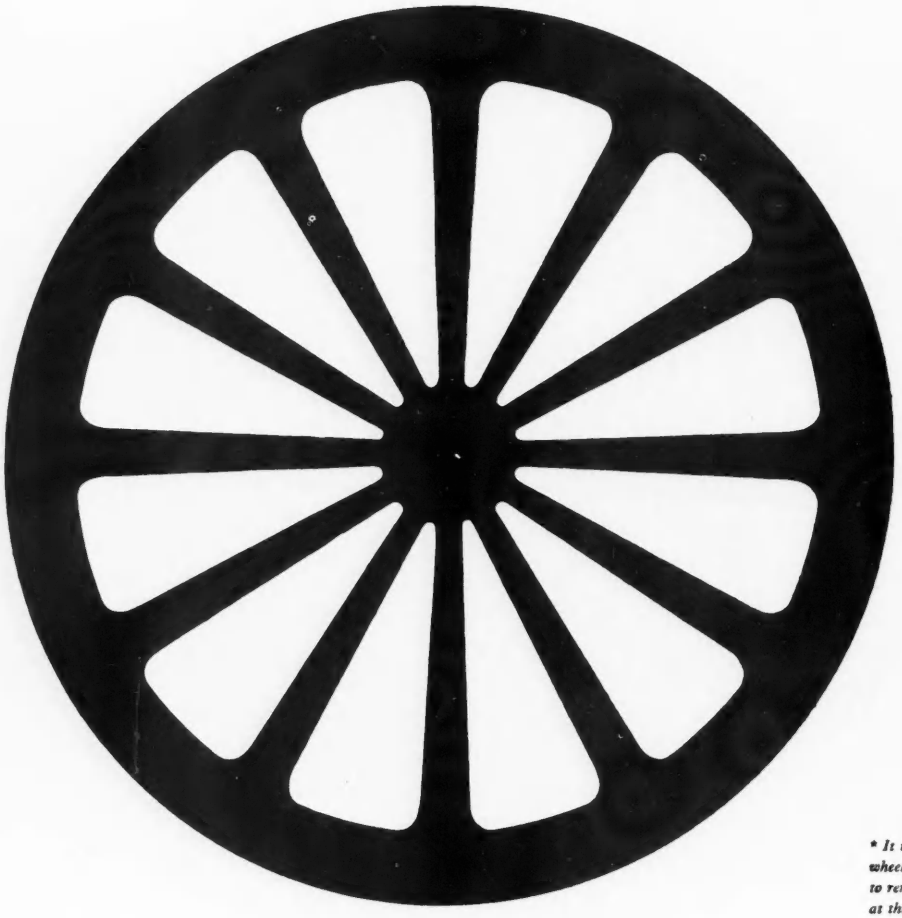
A lot of spokes in our wheel*



** It is unnatural for any wheel connected with Crompton Parkinson to remain still. Blink steadily at this one and watch it revolve.*

...but none in yours

Within the seventy-five year old Crompton Parkinson organisation are a number of separate entities. Each is responsible for the manufacture of an essential piece of electrical plant—each is a vital spoke in a mighty wheel that, in turn, keeps the wheels of your industry turning. Yet each entity, though complete in itself, is but part of a common whole — the Crompton Parkinson service to a modern world.

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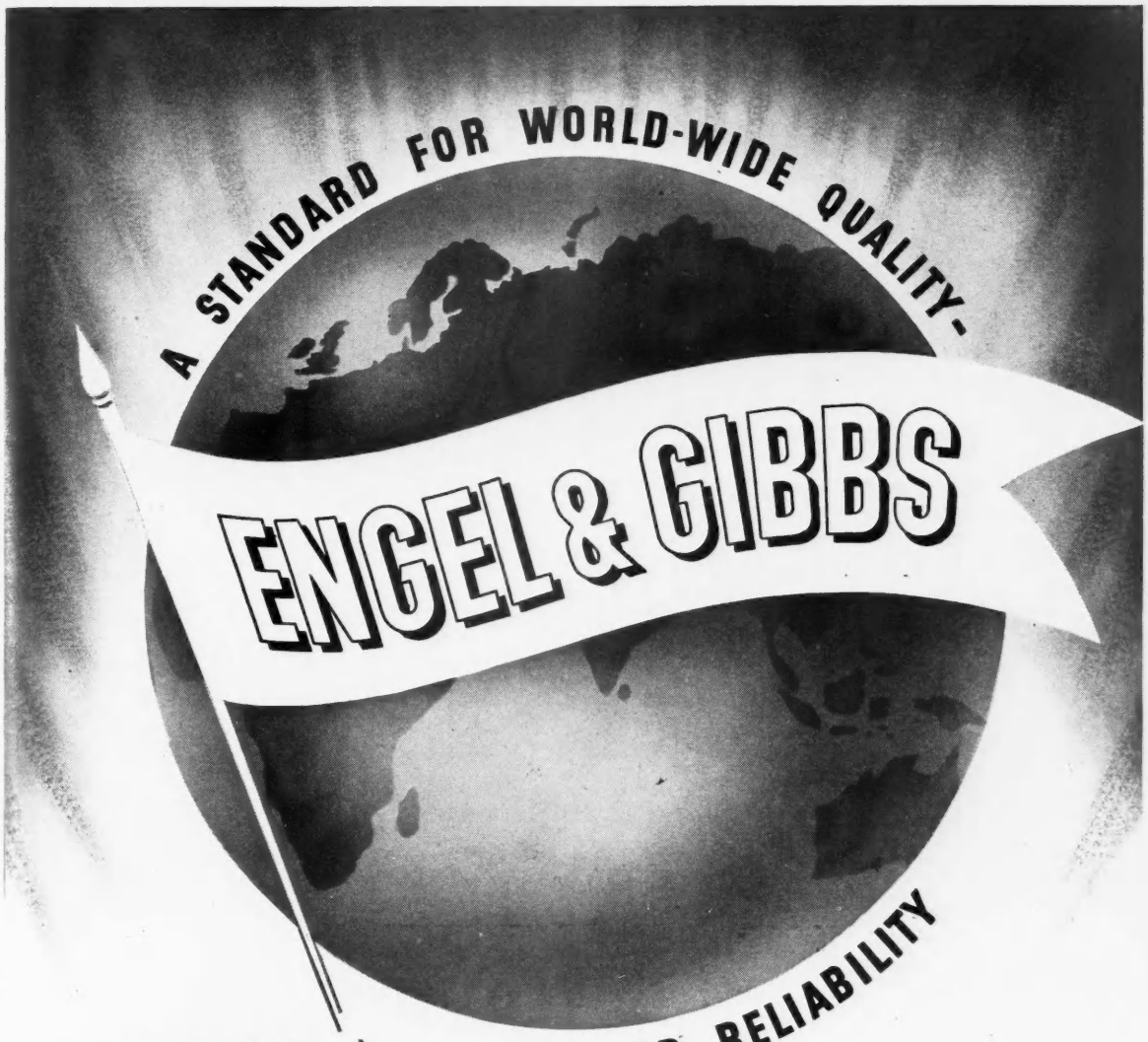

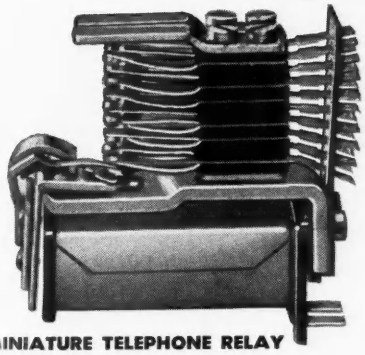

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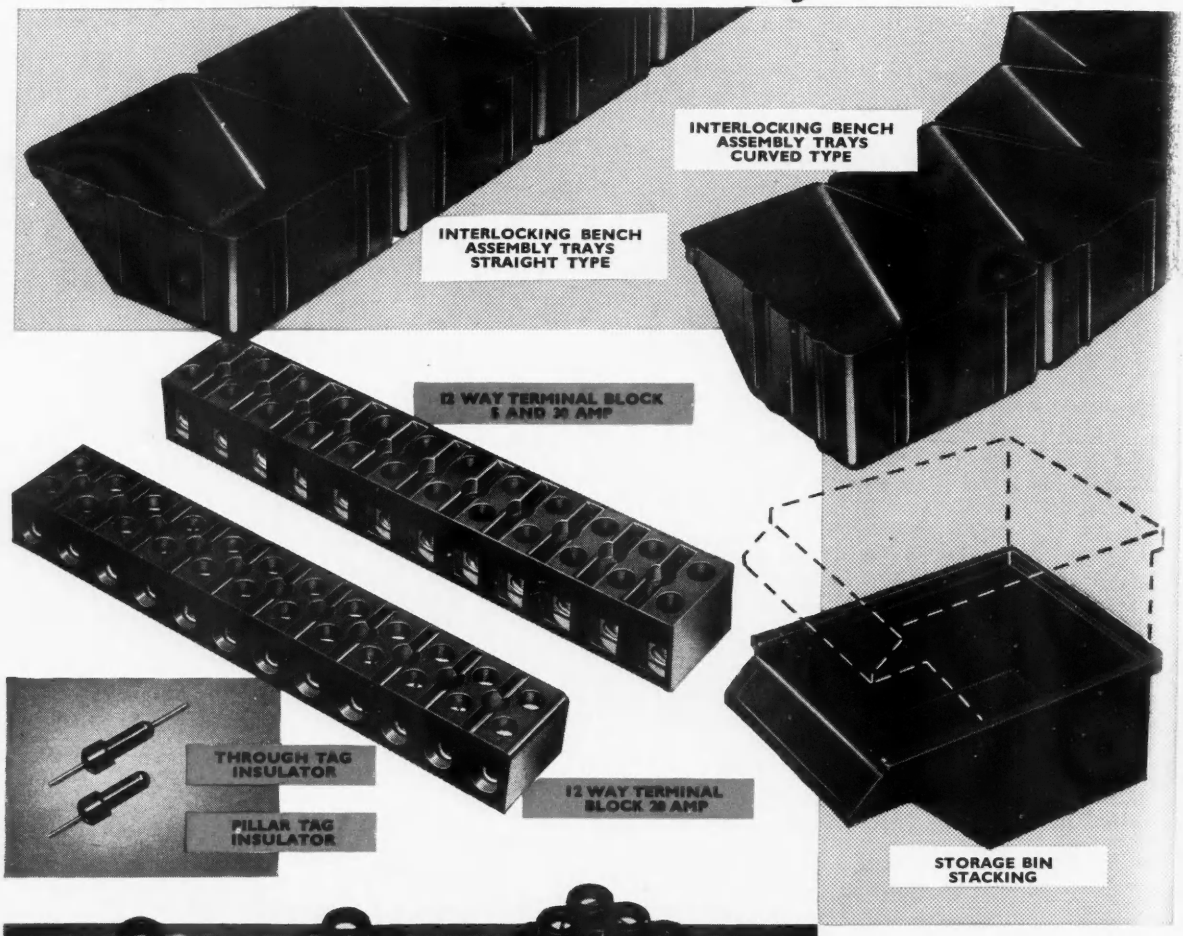
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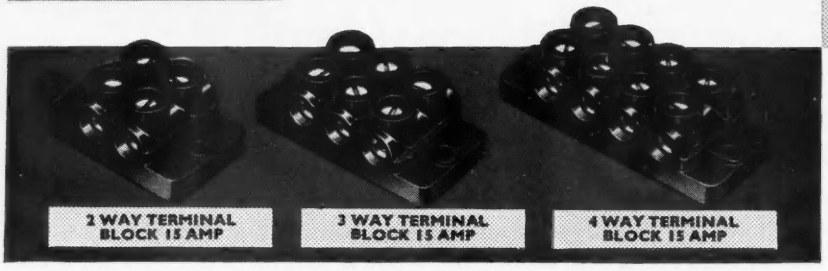

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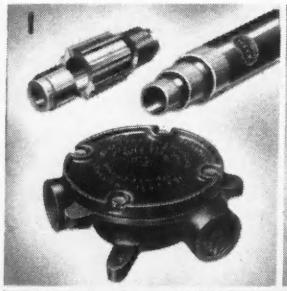
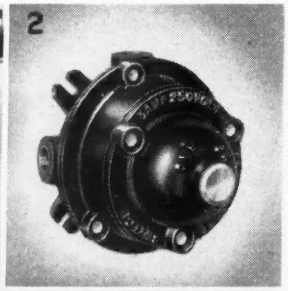
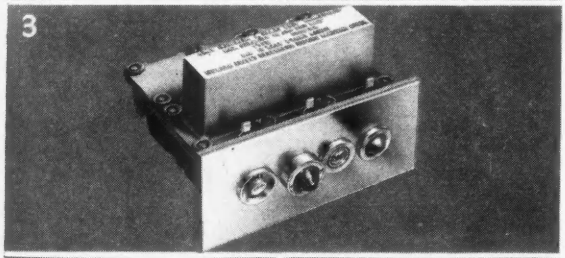
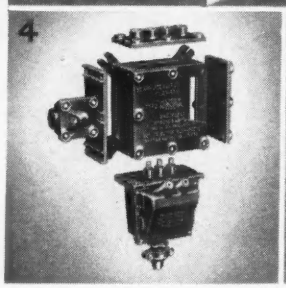
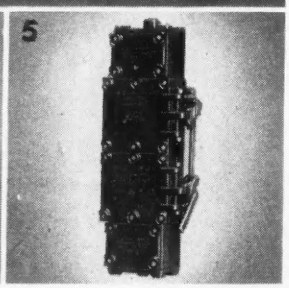
Sealing boxes, glands and complete junction boxes can be supplied for armoured cable.











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2. 5 and 15 amp. S.P. and D.P. switches, 1-12 gang, 5 and 20 amp. T.P. switches. Door, Rotary and 3 heat switches up to 30 amp. Switch and pilot lights. Push Button stations, with or without meters.
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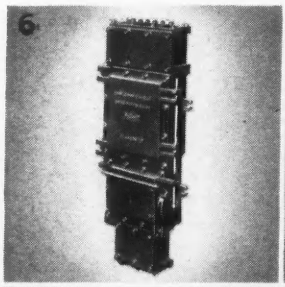

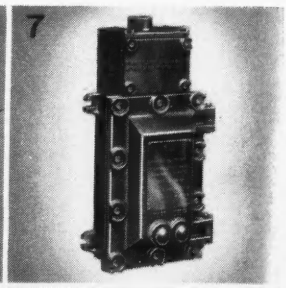

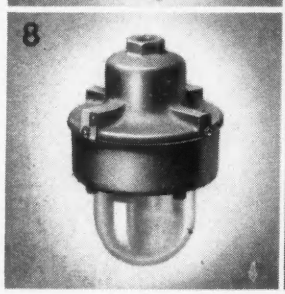

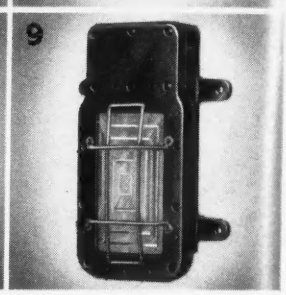

6. Distribution fuseboards. 2 way 15 amp. D.P. to 6 way 10 amp. T. P. & N. and 6 way 30 amp. D.P., with and without isolating switches.
7. Air-break contactor starter 15 amp. capacity., can incorporate meters, push buttons, etc.
8. Wellglass lighting fitting to B.S. S.899. Complete range from 15 watt to 300 watt in a variety of patterns.
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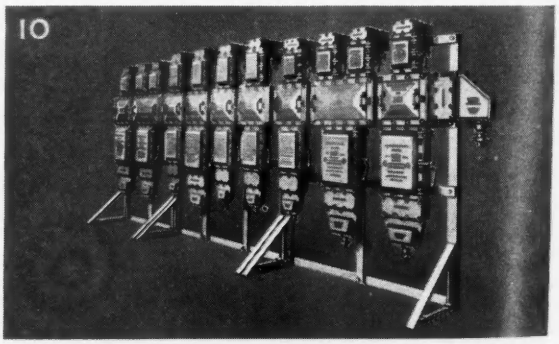

10. Bus-bar panels up to 600 amp. 4 pole, with incoming isolator if required, and outgoing circuits direct on to bus-bars or through switchgear and distribution fuseboards, with or without meters.

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EXCELSIOR WORKS · WEST BROMWICH

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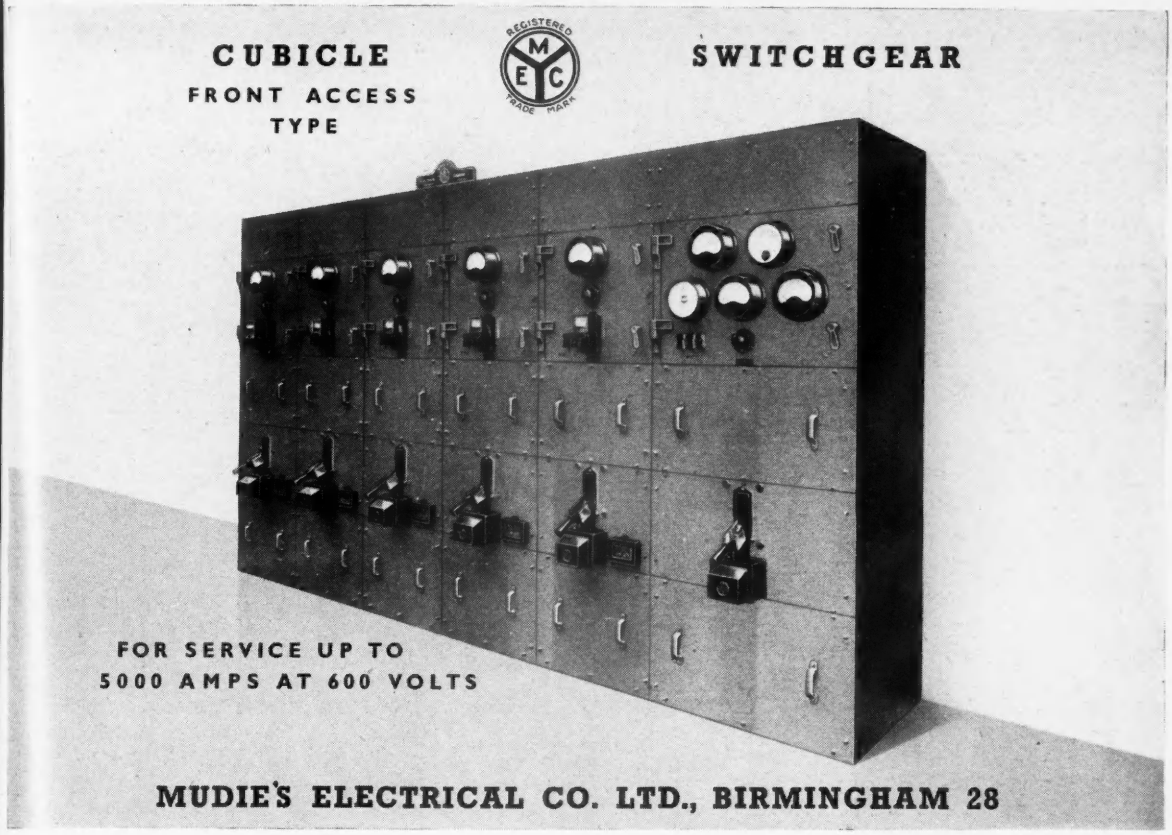

FOR SERVICE UP TO 5000 AMPS AT 600 VOLTS

MUDIE'S ELECTRICAL CO. LTD., BIRMINGHAM 28

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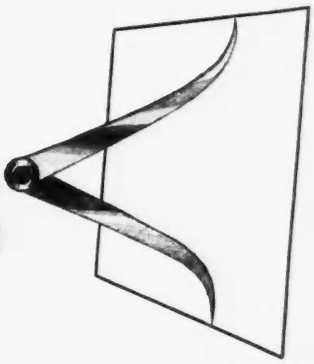

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Brush British Standard Dimension Motors are available in sizes ranging from 1 h.p. to 25 h.p.

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B.S.D. motors by BRUSH

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ALL IN REGULAR DEMAND

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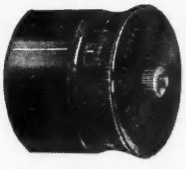
NIGHT LIGHT

100/125 volts A.C.
40/60 cycles or
200/250 volts A.C.
40/60 cycles

Can be connected to any existing Standard B.C. Lampholder. Recommended for use with a 6-volt, 3-amp. Miniature Screw Bulb.

APPROX. 600 HRS. OF LIGHT FOR ONE UNIT



E/85/149 with Surface Mounting Socket.

ELECTRIC CLOCK CONNECTORS

Complete with Fused Plug and Surface or Flush Mounting Socket, lock nut and screw.

E/84/149 with Flush Mounting Socket.

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are unaffected by oil and will absorb a small amount of angular or axial shaft mal-alignment. Range of 6 couplings, from .01 h.p. to .5 h.p. per 100 r.p.m. Maximum speeds, 4,000 to 10,000 r.p.m. according to size.

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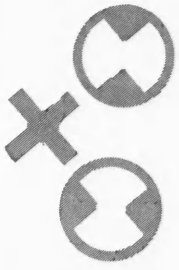
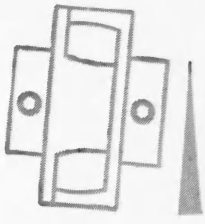


Only three working parts —two metal half-bodies with intersecting jaws separated by a resilient rubber spider.

Attachment to shafts by means of a suitable screw in each half-body: there are no projections.



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flexible in design
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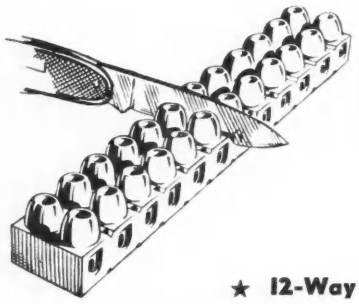


★ **12-Way**

★ **Easily Sectionalised**

★ **Captive Terminal Screws**

★ **Mechanically Shockproof**

★ **Rating 5 amp. May be used at designer's discretion up to 10 amp.**

★ **Overall size 5" x .750" x .625" high. Hole centres spaced .425"**

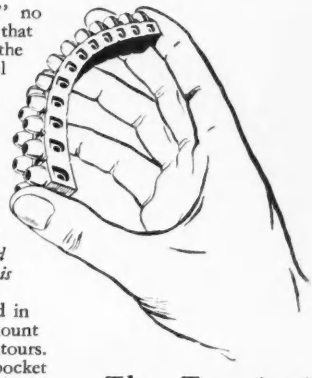
This component revels in "rough going," no surfaces are too uneven. Corners and curves, that would preclude the use of a rigid type, are just the conditions that show up the novel and useful features of this flexible terminal block.

In addition, many of the difficulties experienced when using the rigid type of block are overcome, e.g. broken mouldings due to tightening of screws, lost terminal screws, and the difficulty of modifying to the required number of ways.

In the "Belling-Lee" design the terminal screws are captive, the heads being firmly gripped by the resilient P.V.C. moulding *and cannot be shaken out or fall out, even when the block is mounted upside down*, or carelessly mishandled.

The moulding is flexible in both planes, and in consequence will fit snugly with a minimum amount of effort to most radiused surfaces and uneven contours.

The component can be cut with an ordinary pocket knife into smaller groups of terminals as required, and for the purpose of fixing, holes are provided between each pair of terminals.



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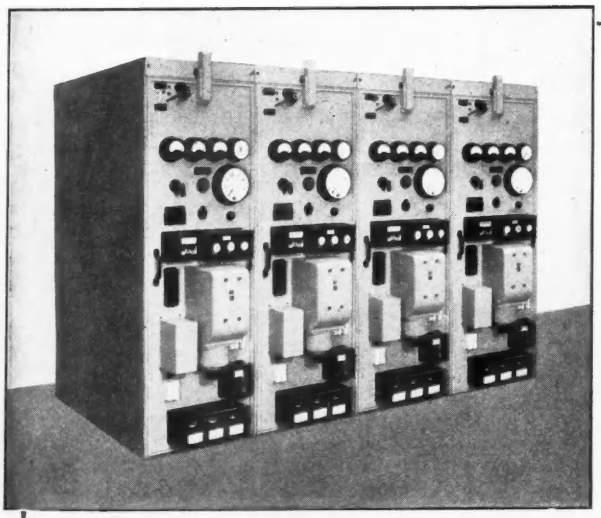
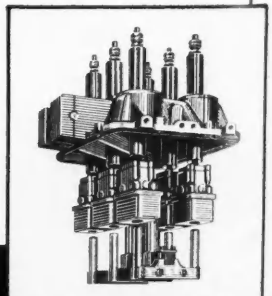


250 MVA
Switchgear
with
TYPE H. 25
oil circuit breakers
6·6 & 11kV



The switchgear is of the air insulated truck or fixed cubicle pattern. The oil circuit-breakers are A.S.T.A. certified and may be arranged for hand, spring or solenoid operation. They can be supplied as loose units for the replacement of obsolete breakers.

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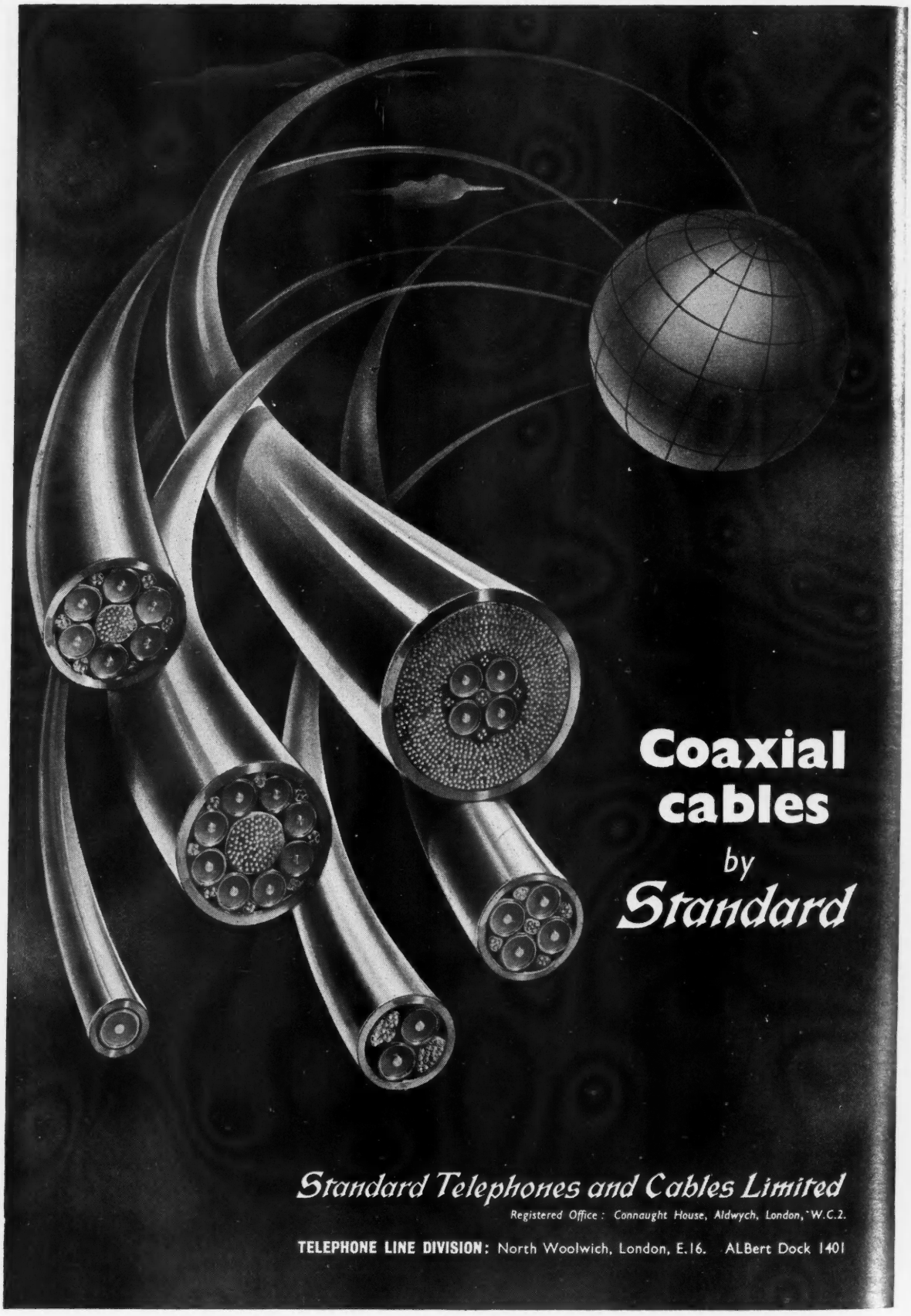
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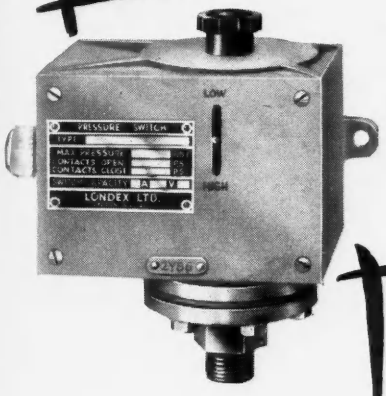

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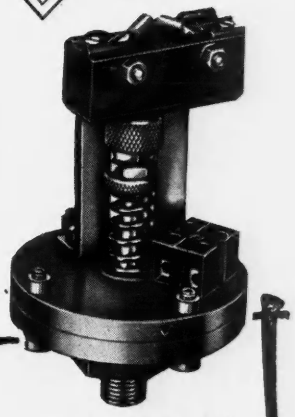

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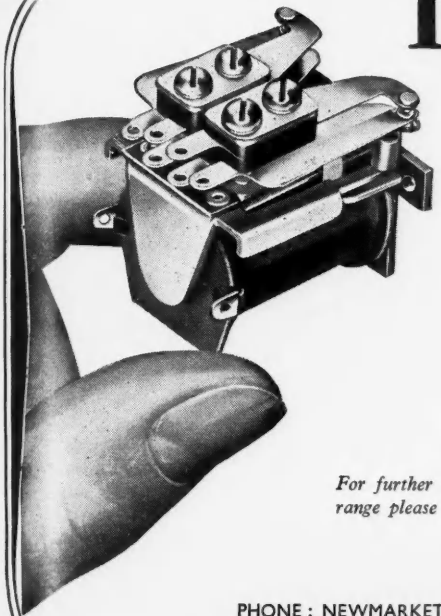

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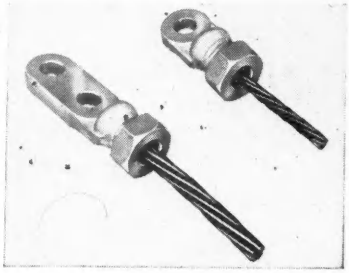

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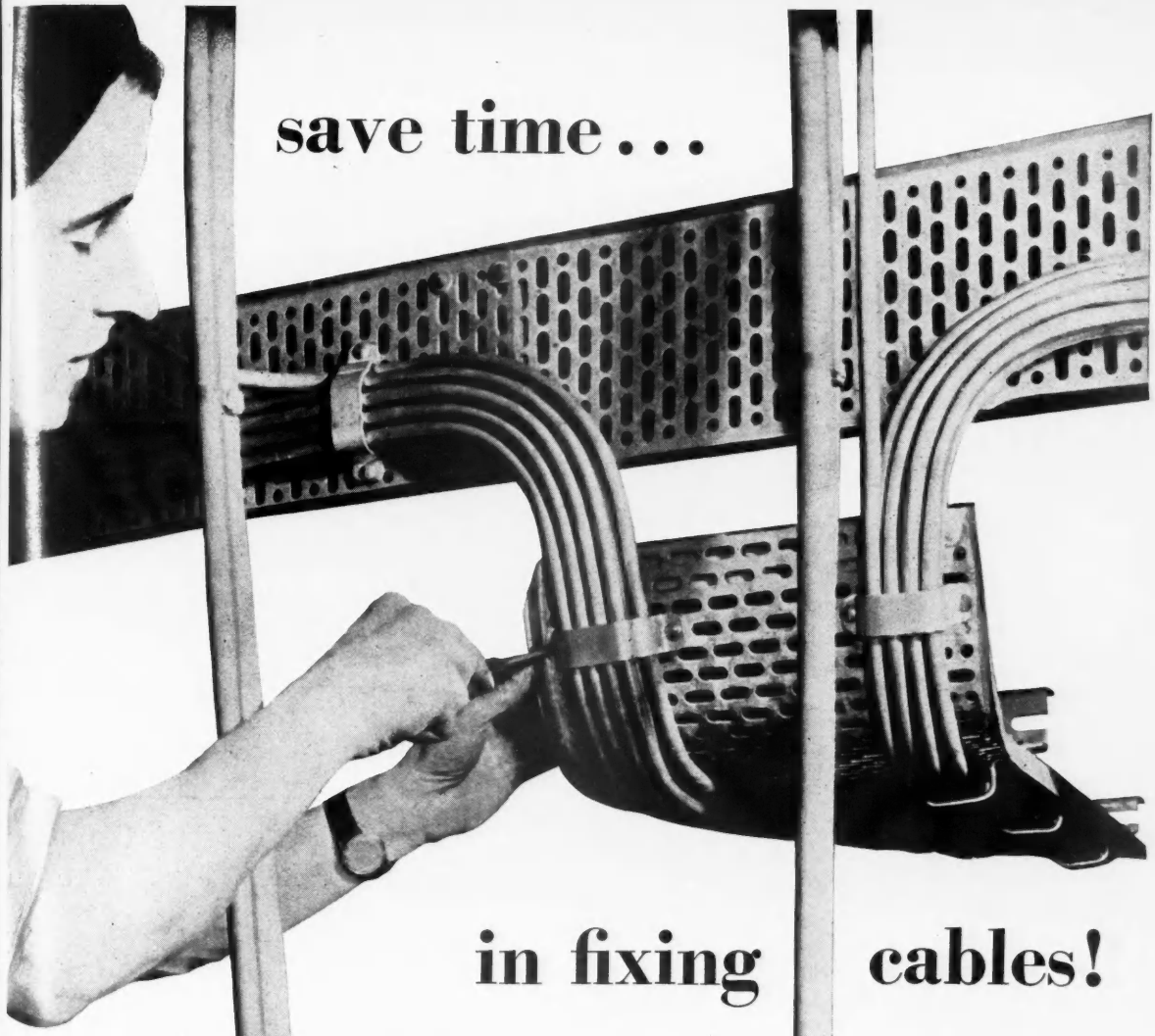

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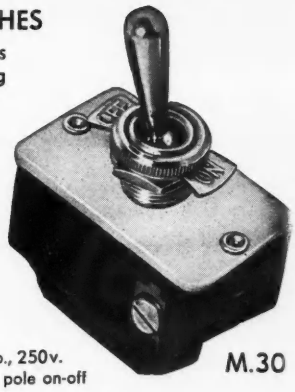

M.30

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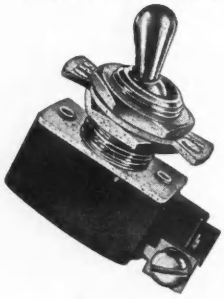

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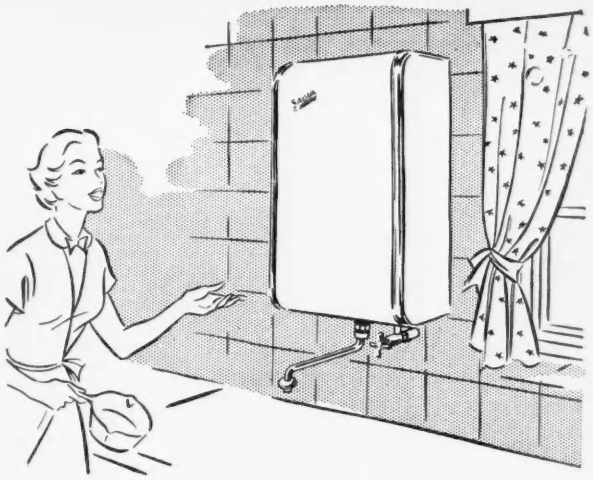

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7.5	1.82	2.58	3.16	3.65	4.47
10	1.58	2.24	2.74	3.16	3.88
15	1.29	1.83	2.24	2.58	3.16
25	1.00	1.41	1.73	2.00	2.45
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350	.268	.378	.463	.535	.655
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1,000	.158	.224	.274	.316	.388
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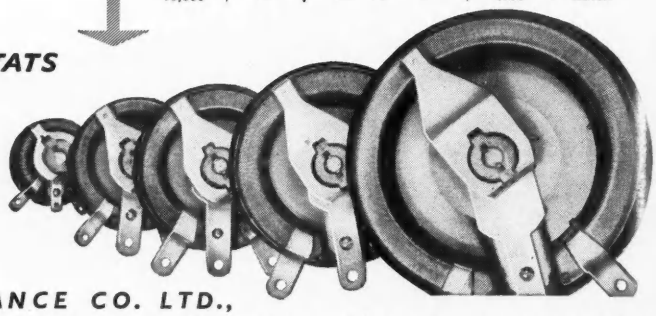

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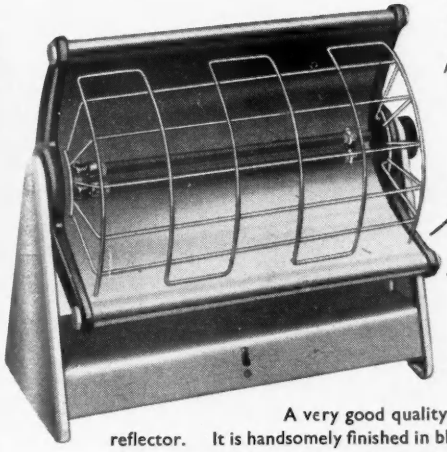

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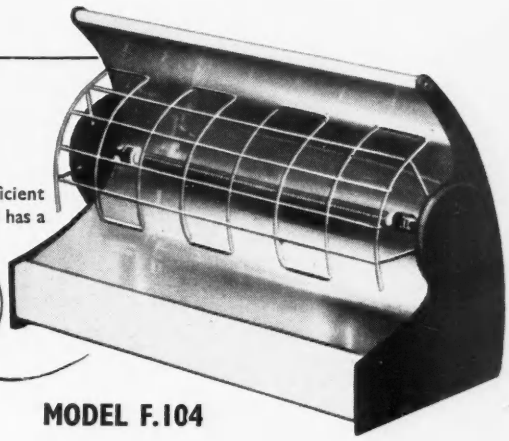

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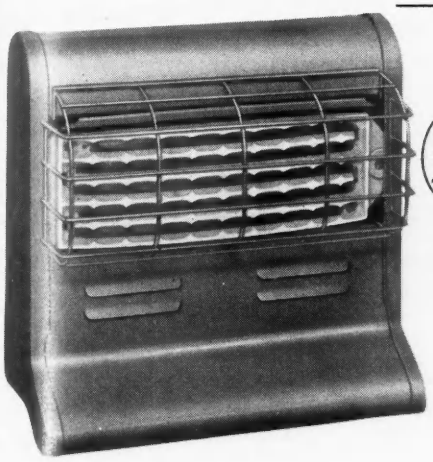

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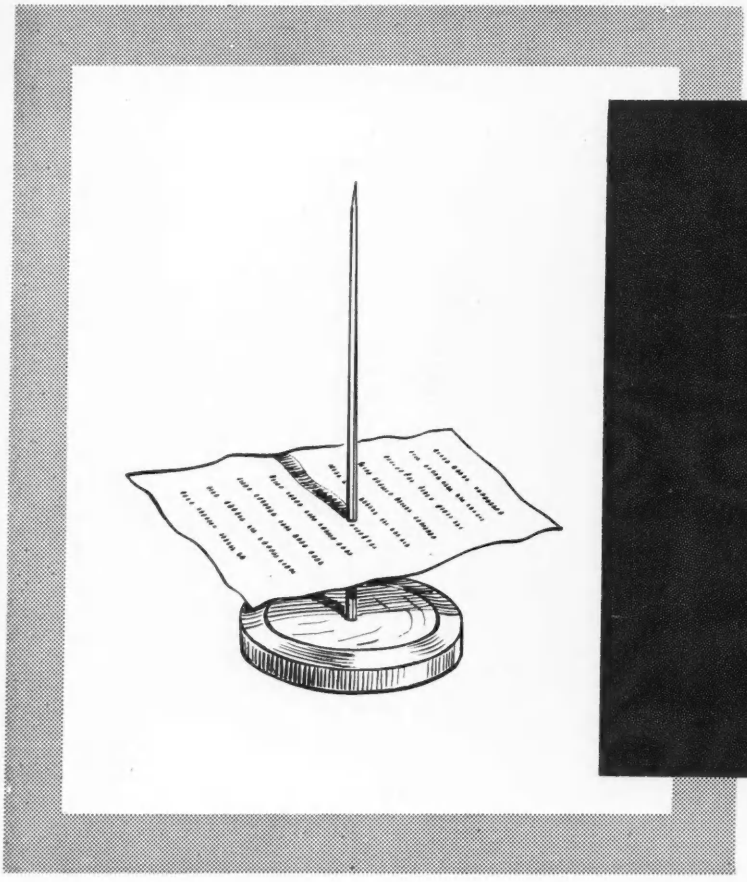

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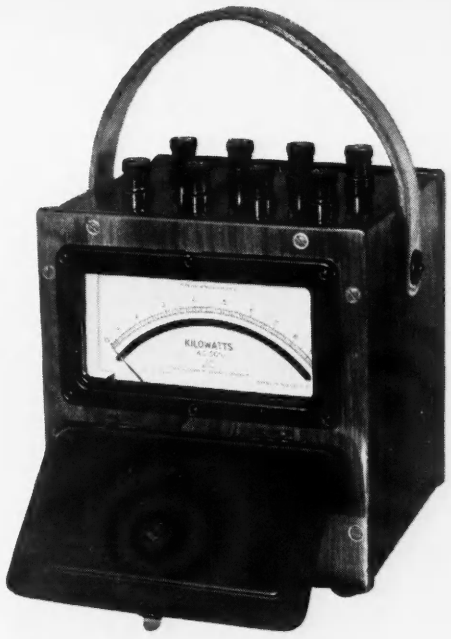

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13 AUGUST 1954

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VOLUME 155 ✧ NUMBER 7

Eighty-Second Year of Publication

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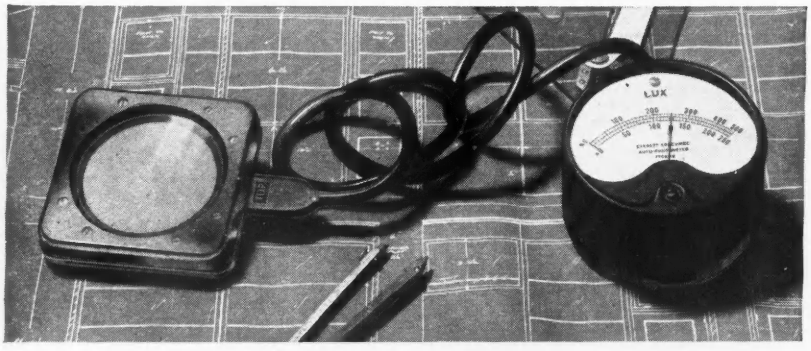
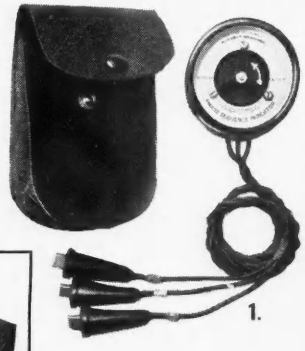
Editorial, Advertising and Publishing Offices: Dorset House, Stamford Street, London, S.E.1. Telegraphic Address: "Elecrev, Sedist, London." Code: ABC. Telephone No. Waterloo 3333 (60 lines). Entered as Second Class Matter at the New York, U.S.A., Post Office. Annual Subscription: Home and Overseas £3 6s 0d: U.S.A. and Canada $11.00. Cheques & P.O.s (on Chief Office, London) payable to ELECTRICAL REVIEW PUBLICATIONS LTD., and crossed "Lloyds Bank."

Portable TEST INSTRUMENTS



An indication of the range of portable instruments manufactured by Everett Edgcumbe



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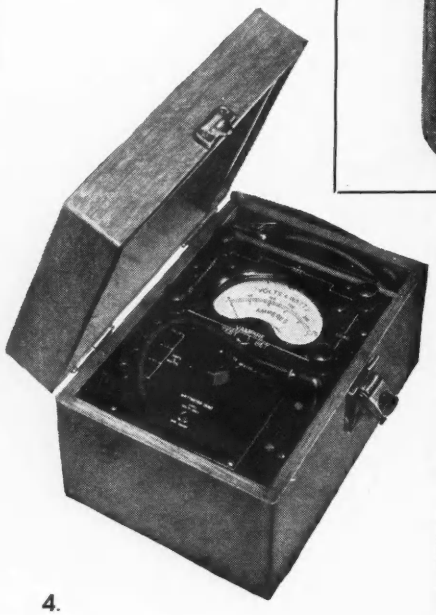

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1. Phase Sequence Indicator (Catalogue Sheet 261A)
2. Auto Photometer (Catalogue Sheet 464A)
3. Hum Metrohm Insulation and Conductivity Tester (Catalogue Sheet 242A)
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ELECTRICAL REVIEW

13 August 1954 Vol. 155 No. 7 Established 1872

Electricity and Steel

TWO recent developments in the steel industry remind us forcibly once again of the interdependence of the electrical and iron and steel industries. These developments are the integrated steelworks of Dorman, Long & Co., Ltd., at Lackenby which were described in the *Electrical Review* last week and the new blast furnaces of the Appleby-Frodingham Steel Co., which are described elsewhere in this issue.

The enormous steelworks at Port Talbot, South Wales, of the Steel Company of Wales, Ltd., which has now been operating since 1951, seems to have set a pace for steelworks integration, although none of the followers seem to have attained such a high degree of comprehensiveness as at Port Talbot where in one flow line the whole sequence of operations including coke making, pig iron production, steel making, heavy slab and bar rolling and hot and cold steel strip rolling are incorporated in one continuous line which embraces excellent examples of electrical applications.

We believe that these works are the largest in Europe and probably the largest in the world if account is taken of the particularly high degree of integration which is said not to have a parallel in the United States. On a smaller scale there is integration to a similar extent at the steelworks of John Summers & Co., Ltd., in Cheshire, but in the case of the Dorman, Long works line strip rolling is not included. Integration of the production plant at both Port Talbot and Lackenby has also resulted in an excellent combination of electrical systems and at Lackenby we have a good example of three works distribution schemes welded into a common whole with a public supply system and private generation power stations.

The outstanding feature of the Appleby-Frodingham development is the new blast furnaces which, with hearth diameters of 28ft 6in and 27ft, are believed to be the largest in Europe. We have not yet got as far as blast furnace operation by direct electric heating of which there are outstanding examples in Norway, but inasmuch as we are on the threshold of extraordinary developments in the use of atomic energy, so must we expect corresponding advances in the electrical industry because so far electricity supply appears to be the only medium through which atomic energy can be applied. True we have already given a warning about the possibility of the use of heat for such large-scale applications as blast furnaces directly from the nuclear reactor. Although that is mere speculation, we feel that we are justified in thinking that the economics of atomic energy development may become reflected in those of electricity supply with the result that electric heating of blast furnaces may become feasible.

Finally the Battelle Report which was recently published in the United States points to the heating electrically of the open hearth furnace. This, with the electrically-heated blast furnace, would give us the truly all-electric steelworks which now seems to be not altogether wishful thought.

INDUSTRY AND EDUCATION

The publication within only a few days of each other of the Memorandum on Higher Technological Education issued by the Parliamentary and Scientific Committee (*Electrical Review*, 30th July) and the report of the independent committee set up by the Federation of British Industries on " The Shortage of Science Teachers," which is reviewed elsewhere in this issue, points to the extreme seriousness of the position which is being created by the unsatisfactory rate of recruitment of graduates into the scientific and engineering industries. Special significance is given to this by the constitution of both investigation bodies, the Parliamentary Committee being made up of members of both Houses of Parliament together with representatives of outside bodies and learned societies, and the F.B.I. Committee consisting of representatives of all types of schools, universities, research organizations and industry, all working under the chairmanship of Dr. Percy Dunsheath, C.B.E. Above all we particularly wish to stress the ominous statement in the shortage of teachers report that the alternative to large expenditure in the direction called for is likely to be the gradual drying-up of the source of scientific manpower and, ultimately, disaster for British industry.

WIRING REGULATIONS

Useful after-service is rendered by the I.E.E. Wiring Regulations Committee in giving guidance in the practical application of the code in specific instances. Many of those whose work depends on a thorough understanding of its requirements are unaccustomed to interpreting a document that is necessarily couched in somewhat legalistic terms, which are designed to cover all contingencies as far as these can be foreseen. Their task is not made easier by the again necessary cross-referencing or by the lists of exemptions permissible in appropriate cases. In this issue we summarize rulings of the Committee that appear to be of most general interest. Some of the inquirers raise points that are deemed by the Committee to merit further consideration when preparing the next (13th) edition of the Regulations.

ELECTRICITY FROM PEAT

It is a courageous movement on the part of the North of Scotland Hydro-Electric Board to undertake on an experimental scale the production of electricity from the burning of peat as is outlined elsewhere in this issue. Courageous, we think, because of the tendency now to regard atomic energy development as a probable solution of our long-term fuel problem. Such an attitude is dangerous, and for the time being and probably for some years ahead every effort should be made to ensure the fullest possible use of any fuel that is readily available.

CHEAPER CABLES?

When Mr. Duncan Sandys announced recently the assurances of the Cable Makers' Association and the Covered Conductors Association of their willingness to conform with the modified recommendations of the Monopolies Commission he reiterated that Commission's tributes to the part played by the C.M.A. in developing and raising the quality of electric cables. It might be thought that the benefits the Association had thus secured for this country would have absolved it from any accusation that its members were making too much profit through their schemes for regulating cable sales, but this is not so. The industry has been involved in a great deal of trouble and expense through the Commission's investigations, but it is pretty certain that this mountainous labour will result in a rather small mouse so far as the public is concerned.

STRATEGIC WITHDRAWAL

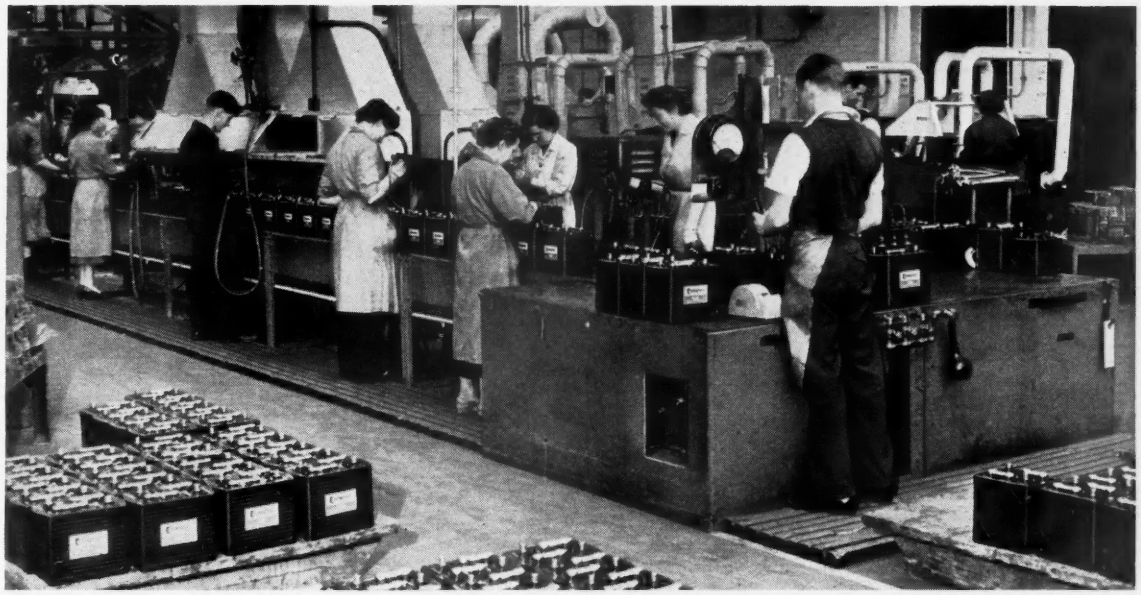
Sensing that the strike of electricians employed by J. Lyons & Co., Ltd., was on the point of collapse because of a gradual drift back to work, Mr. W. C. Stevens, secretary of the Electrical Trades Union, advised the men on Saturday last to return on Monday. He thought that no useful purpose would be served by continuing the strike. We have said the same since the strike began in April. Nothing has been achieved and the Union and its members have probably fared worse than the employers, who do not appear to have been seriously affected. There is no justification for the E.T.U.'s insistence that supervisors (or at least the particular supervisor concerned) should belong to the Union. We hope that no attempt will be made to penalize the men who saw the error of the move and returned to work against the wishes of the Union.

PORTUGUESE PROSPECTS

Cabril power station, described on another page, will add substantially to electricity production in Portugal, which in 1952 amounted to about 1,330 million kWh from 700 MW of generating capacity (publicly and privately owned). According to an estimate by Mr. P. de Barros at the recent World Power Conference, only 5 per cent of the power used in that country is electrical. Opportunities for British electrical manufacturers, whose position has been further secured by the provision of the equipment of this station as well as that of the earlier associated Castelo do Bode station, seem most promising.

COOKER SURVEY

Next week in our series of illustrated surveys of domestic electrical apparatus we shall be dealing with cookers. Particulars given in tabular form will cover dimensions, hob equipment, loadings, controls, special features, finish, price, etc. This series, which is to be published at three-weekly intervals, will be of great value for reference purposes and, as the demand is likely to be heavy, orders for additional copies of the *Electrical Review* should be placed without delay. The next surveys will cover electric fires (10th September) and low-temperature heaters (1st October)



Battery Manufacture

Concentration of Crompton Production at Newport

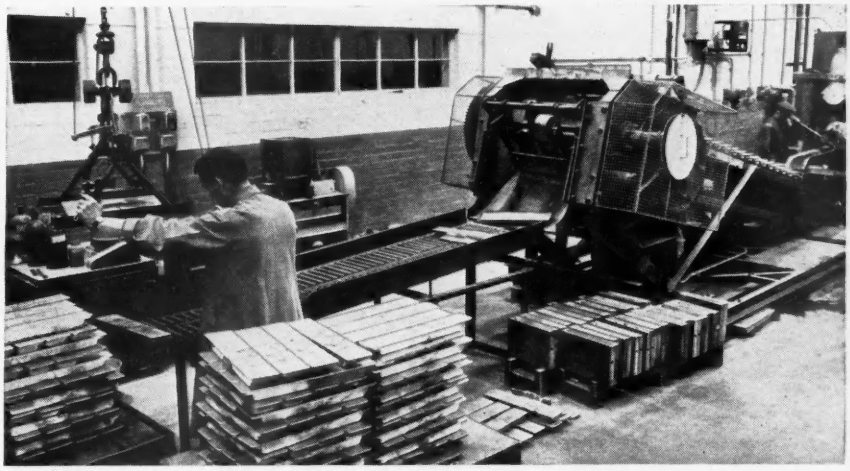
A PROGRAMME spread over a period of two years for the gradual transfer of all battery production to its new factory at Stephenson Road, Newport, Monmouthshire, has now been completed by Crompton Parkinson, Ltd. Previous to the acquisition of this factory manufacture was carried out mainly at the New Malden works of the associated Young Accumulator Co., Ltd., with the assistance of small auxiliary factories at Midsomer Norton and Doncaster.

The company's association with the accumulator business goes back to before 1890 when its predecessor, Crompton & Co., Ltd., in a works at Llanelly, manufactured the Crompton-Howell accumulator developed jointly by Col. R. E. Crompton and the works manager, Mr. J. C. Howell. This original accumulator had plates in the form of slabs sawn out of blocks of porous lead and the first production process was the continuous stirring of a mass of molten lead in a pan with slow cooking until, when the lead was on the point of crystallization, it was cast into the form of porous blocks.

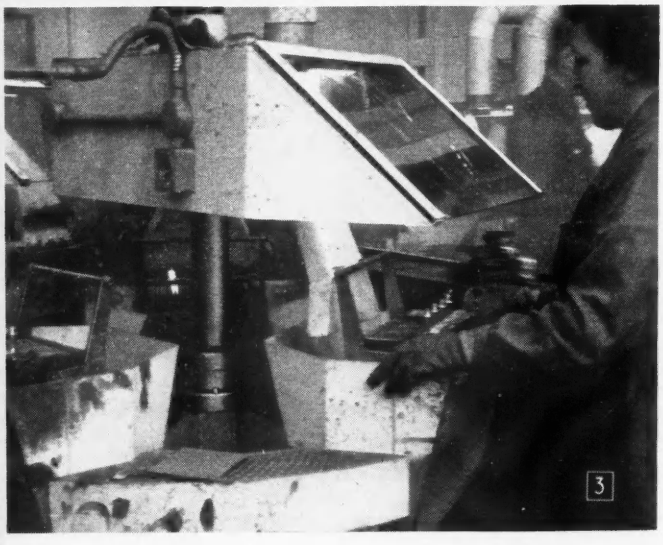
As the containers for the plates were far too large to be made of glass they used wooden vats lined with lead. They developed a method of joining up the plates to the connecting bars by autogenous soldering or lead burning. For more than thirty years an installation of Crompton-Howell batteries was in service at the Albert Hall, London.

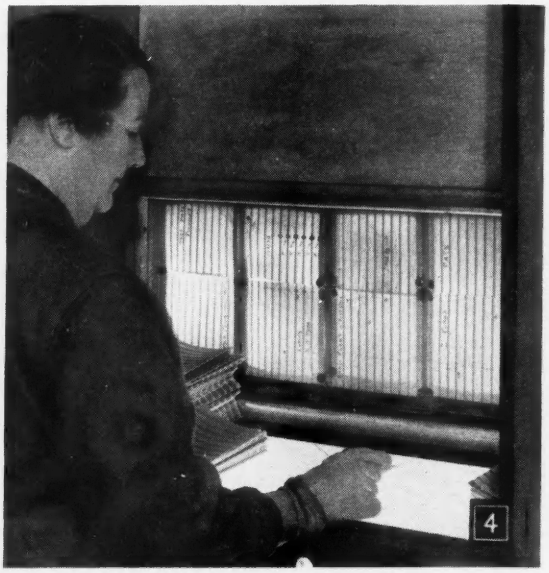
The Young Accumulator Co., Ltd., began manufacturing accumulators of all types at a small factory in Fulham in 1927 before moving to New Malden. It developed the well-known armoured-plate battery for electric vehicles and trucks, its interest in electric traction expanding with the taking over of Electricars, Ltd., and A. E. Morrison & Son in 1938. When war came the company made batteries for the services, notably for equipping sweepers to deal with the magnetic mine.

The association with Crompton Parkinson, Ltd., in 1941 provided the opportunity for a reorganization for greater



Automatic casting machine for producing the lead antimony alloy ingots used in the manufacture of the grids





production and efficiency and led to the establishment of the new factory at Newport designed on the most up-to-date lines. Although possessing about the same floor area as New Malden, the Newport factory, thanks to its modern single-storey layout and the more extensive mechanization, has a considerably larger output.

It is this factory which is now producing the new "Crompton" batteries that were introduced last October when the brand name of "Young" was discontinued. Among the special features of the Crompton battery is a new design of grid which is made from "Nilcrode" alloy and retains the active material more securely, stays rigid and resists corrosion. A new active material gives increased power, especially for cold starting. Longer life and improved performance also result from the use of the "Dri-stor" microporous separators which are virtually indestructible and are completely unaffected by immersion in acid. The tough, shockproof hard rubber containers withstand rough handling and continual vibration without cracking and developing leaks. New finger grips give speedy, easy unscrewing of the non-splash vent plugs, and the increased sectional area of the connector bars give higher starting voltage.

Unlike the early batteries which depended for their success largely on solid construction involving the lavish use of materials and a rather cumbersome design, the reliability of the new battery with its high power weight ratio and compactness is assured by a comprehensive quality control system involving materials, components and construction. The control of quality begins by the taking of samples of raw materials as they are received and subjecting them to an analysis and tests in the laboratory. This ensures that no materials are used in production unless they are of approved quality standards.

The layout of the factory is planned so that the various raw materials are received at each of three corners of the building, the completed batteries being dispatched from the fourth. The floor is divided roughly into four departments. The first makes battery plates, the second ebonite components and the armouring material of the positive plates of traction and heavy duty commercial batteries. In the third department all types of battery are assembled. The fourth is concerned with charging and dispatch.

Oxides, antimony and lead, the raw materials for the

Fig. 1. This automatic casting machine produces pairs of grids for motor starter batteries

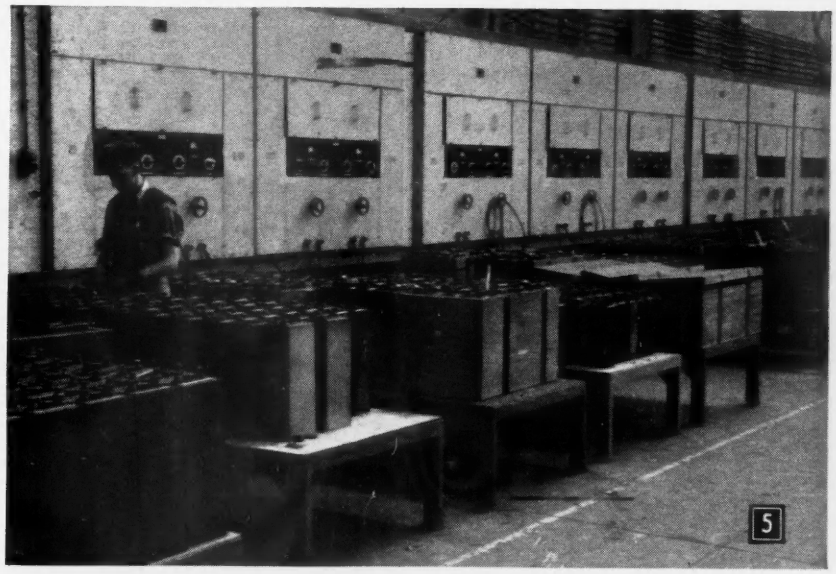
Fig. 2. Double grids are pasted on this machine

Fig. 3. Assembling groups of starter plates

Fig. 4. Inspecting the " Dri-stor " microporous separators for imperfections

Fig. 5. Traction batteries in the charging department

Fig. 6. A portion of the formation room

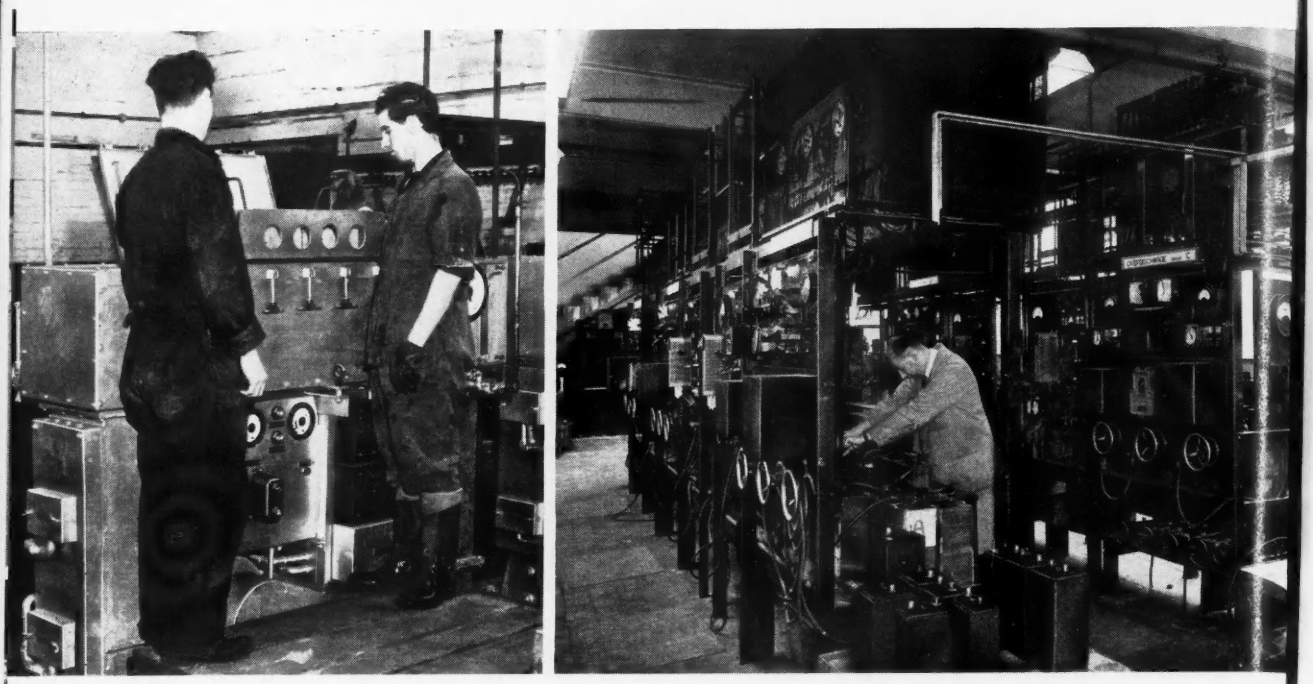


battery plates, are brought straight into the factory close to the paste mixing and grid casting sections. The oxides are the ingredients of a paste which, after processing, becomes the active material of the plate. The 2 cwt drums of oxides are off-loaded to an electrically driven auto-lift which travels past the top ends of gravity conveyors installed side by side so that the different oxides are sorted out on to each conveyor and used in the order received. This arrangement ensures that there is no risk of stale oxides getting into the paste mix. One drum at a time is removed by a mechanical selection device, and transported by an overhead runway hoist to the oxide mixing machines. During the mixing and tipping processes special care is taken to screen the operator from dust. Where applicable the " Provenair " system of air extraction is installed.

Supplies of lead, antimony and other ingredients for the plate grids go to an alloying furnace whence the molten alloy flows into an automatic ingot casting machine. Use of electric hoists and conveyors eliminates all manual handling. The ingots are then loaded as required into the melting pots adjacent to the grid casting section. Here mechanical casting machines produce battery grids, which are trimmed, inspected and loaded on to a monorail conveyor. Mixed paste is also loaded on to the same conveyor so that both components of the plate travel together to the section where the grids are pasted.

Grouped in containers the pasted plates are taken by conveyors through the processes which " convert " the active material and so produce plates that are mechanically sound and reliable. Scientific instrumentation enables processing conditions throughout the conversion period to be controlled precisely.

After passing through a drying chamber, the plates are carried by conveyor to the formation room where there are several rows of tanks filled with electrolyte. The conveyor is arranged in " loops " between the rows of tanks to allow for the plates to be off-loaded adjacent to any set of tanks not already in use. Plates are then temporarily connected



Left: Dry charging apparatus. Right: Batteries undergoing life tests

together in groups by burning on lead strips to the grid lugs, and placed in the tanks. When the appropriate number of tanks have been filled, the groups of plates are connected in series and given a formation charge by direct current from a bank of mercury arc rectifiers. After formation, the plates, again suspended on the overhead conveyor, pass to a drying oven before going into the formed plate stores. Here filing and trimming machines prepare the plates for assembly.

Special Sheet Materials

Next to the formation room is the department known as the "rubber shop." Here "rubber" materials are received and prepared for the production of battery lids and other components by hot press moulding. In this department are also prepared the new microporous separators, and the special sheet materials used for the "Crompton" armoured positive plate assembly. This sheet material is a resin-bonded glass silk product, highly porous but of exceptionally mechanical strength. The sheet is placed on both sides of each positive plate of heavy duty commercial and traction batteries to prevent any tendency for particles of active material to work loose after long periods of service with high current discharges and severe vibration. The resin-bonded glass silk sheet has both mechanical strength and the high porosity required to allow the electrolyte easy access to the active surface of the plate.

The armoured positive plate assembly is carried out on a special line where each positive plate is covered on both sides with, first, a sheet of glass silk, then a sheet of resin-bonded glass silk. The latter sheets, which overlap the positive plates both on their length and width, have a strip of soft rubber wrapped between them around their edges. Vulcanization of this rubber strip to the side produces an enclosing envelope open only at the top, thus permitting the free escape of gases.

Plates and moulded parts for the other types of batteries are passed into the main assembly department where they are joined by other components from the adjacent main stores. Each assembly line is in the shape of a "U." Plates loaded on to a stillage as they are prepared, are brought to one end of the line by an electric truck. After the plates have been assembled into elements by interleaving groups of positive and negative plates and inserting separators, they are placed into the battery cases, the lids are put on, the connector bars are fitted and the top of the battery is sealed off. Each battery is given a final inspection and test before going to the dispatch stores.

Heavy duty traction and commercial batteries may be given an initial charge before dispatch. Since it is most important that the initial charging of a battery should be carried out correctly, car batteries for overseas countries where the technical servicing facilities may be inadequate, are given this initial charge at the works by a process of "dry charging." This ensures that the critical first charge is given under carefully controlled conditions. After charging the batteries are hermetically sealed and can be stored indefinitely in any climate.

Research and Development

Supporting the production departments is a very active research and development organization. The laboratory has automatic equipment used for life-testing batteries under both normal and abnormal conditions. Batteries on test undergo repeated cycles of charging at various rates corresponding to conditions such as under- and over-charging, and over-discharging. Life tests continued until a battery fails as the result of an internal fault allow for investigations into the causes of failure to assist development to ensure greater reliability under difficult conditions of service.

Apart from the regular life tests, batteries are also subjected to rigorous conditions equivalent to operation in extremes of temperature. For investigating the effects of excessive discharges an oil-immersed variable resistor can be switched in and out of circuit with the battery under test by means of a solenoid-operated oil-circuit breaker.

Kidbrooke School

An Extensive Electrical Installation

THE first of the London County Council's comprehensive secondary schools will open in September in Corelli Road, Kidbrooke. Designed to accommodate 2,000 girls, the new school includes an assembly hall to seat nearly 1,500, a library and reading rooms, five gymnasia, laboratories, studios, housecraft flats and practical rooms for needlework, craft, cookery and commercial subjects, in addition to thirty-six classrooms, some of which are equipped as subject rooms.

The electrical services provide for lighting, power, general purpose socket outlets, tutorial cooking, sound relay and signals, and impulse clocks. There are approximately 2,000 lighting points. The classrooms are illuminated by means of 75 W lamps in Hume Atkins ring louvred fittings while for the practical rooms Courtney Pope 80 W 5ft fluorescent louvred or diffused fittings are employed, the fitting rooms for dressmaking having vertical fluorescent fittings built into the folding mirrors. The corridors are lighted by S.L.R. hemispheres either ceiling or wall mounted.

In the assembly hall are 300 W ring louvred recessed direct fittings and indirect tungsten battens (Courtney Pope) in each cove in the ceiling, the stage or concert platform being lighted by Strand 200 W " slat " louvred recessed fittings. The assembly hall and stage lighting can be auto-dimmed, either together or in sections, from two control points, the sections being direct auditorium lighting, indirect lighting and stage lighting. A portable stage lighting system is provided, the stage board being permanently wired and installed behind removable panelling to dip boxes in the floor. A " fit-up " with proscenium arch can be erected and the stage lighting supplied from the dip boxes. External lighting of the building is provided by " mushroom " type fittings with refractors and diffusers. The front of the hall may be floodlighted.

Approximately five hundred 13 A socket outlets (Walsall) are installed on a ring main with at least one socket outlet in each room. In the laboratories, preparation rooms and lecture rooms the socket outlets are supplied from a 1 to 1 transformer with the centre point of the secondary earthed, to give a voltage of not greater than 110 V to earth. These sockets incorporate double pole fuses and switches and any apparatus in the school may be used from them without altering the plug-tops.

Our title picture shows Kidbrooke School for Girls, the first of the London County Council's comprehensive schools

Sound Systems

There are about 110 loudspeakers (G.E.C. and Reproducers & Amplifiers, Ltd.) throughout the school and each teaching room is provided with class change and radio selector switch, volume and tone controls. The facilities afforded cover fire alarm, public address, class change programme, radio and talk-back. The radio programmes are reset at the central rack and locked on to the same channel as a particular class change programme, of which there are three. These class change programmes may be selected in the classrooms and the radio programme muted out or included, as required.

The operator is able to make a call through all loudspeakers and the call can be answered from talk-back points in the corridors. These points are situated above each fire alarm contact so that staff can talk to the telephone operator, who controls the whole sound system from a remote panel. The headmistress of the school can make emergency or special announcements which can take precedence. In the event of a public address announcement the radio is muted out. The public address system is divided into parts so that the staff announcements may be made without disturbing classrooms. Fire alarm signals take priority over all other signals, which are automatically muted out. The fire alarm system is manually actuated from a number of contacts (Gent & Co.) throughout the school, the area being indicated on a central indicator board. Other communications both internal and external are provided by G.P.O. telephone extensions and by Reliance instruments for the service lifts (Hoisting Appliance Co.).

The hall's sound system is completely independent of the school system and comprises two 15in and eleven 10in loudspeakers for the main auditorium, and eight 8in loudspeakers for the side galleries. A control panel is

provided at the rear of the hall incorporating radio, gramophone and volume and tone controls. Electrically operated Venetian blinds (Venetian Vogue, Ltd.), which run both sides and the whole length of the hall, can be raised and lowered and stopped at any position.

A Gent clock system of the impulse type is provided with one slave clock in each teaching room and departmental head's room, and there are various general clocks throughout. One external 4ft dial clock is provided. Altogether there are about 120 clocks.

Each of the six laboratories is provided with a Legg Industries unit affording low voltage a.c. or d.c. supplies up to 24 V. Each unit, which may be opened for inspection and instruction and is provided with "Variac" control, supplies a number of terminal boxes on benches to which pupils can make connections.

There are nine housecraft rooms and to five of these there are flats attached. Each housecraft room has a number of electric cookers of the domestic pattern (Revo, Jackson, "Creda," G.E.C., B.N.E., and Xcel), and socket outlets are provided for ironing, washing machines (Hoover), wash boilers (Burco and Jackson), drying cabinets (Glover), and refrigerators (Coldrator and Prestcold). The flats are each equipped with a Ferranti "Safera" fire in the living room, a cooker in the kitchen and socket outlets. The advanced housecraft room is equipped with electric steaming oven (G.E.C.), pastry oven (Jackson), grill (G.E.C.), and salamander dual purpose boiler (Jackson), and meals for 50 persons can be provided. There is also a "Sadia" free outlet water heater. All the equipment is supplied in white or near white finish to match the colour scheme.

Power supplies are required for various pieces of apparatus such as sewing machines, potters' wheels, kilns, drying ovens, etc., as well as for the space heating, domestic hot and cold water, ventilation plant and fire services. For the space heating and the domestic hot water low pressure air semi-automatic oil fired equipment is installed.

The assembly hall background heating by radiators is supplemented by two plenum plants, one under each gallery, delivering a total of 22,000 cu ft/min of fresh warmed air from behind the radiators. The extract is by propeller fans extracting from the roof void. The assembly hall is served from a separate constant temperature circuit, but typing room radiators can be transferred from the school to the hall circuit by means of a switch in the porter's room when the hall is in use and these rooms are required as changing rooms. The same switch changes the hall from background to full heating by switching on the plenum plant.

During the period that the hall is unoccupied and only the radiators are in operation, a thermostat controlling a motorized valve maintains a background temperature. The same valve is controlled by a further thermostat set at a higher temperature when the hall is in use, the control which switches on the plenum plant automatically changing from one to another. The boilers and calorifiers were supplied by Hartley & Sugden, Ltd.; the instruments by K.D.G. Instruments, Ltd., the Cambridge Instrument Co., Ltd., and Electroflo Meters Co., Ltd.; the instrument panel by Hartons; the controls by the Rheostatic Co., Ltd.; the circulating pumps by Holden & Brooke, Ltd.; the warm air circulators by Copperad, Ltd.; the heater batteries and fans by Matthews & Yates, Ltd.; and the starters for pumps and fans by the Electrical Apparatus Co., Ltd.

The electricity supply for the building is controlled by Brush main switchgear with Bill Switchgear distribution boards. Approximately 60 miles of cable and 18 miles of conduit were used. Paper insulated aluminium covered and served cables (J. & P.) run laterally in the main under corridor ducts, with rising mains accommodated in cupboards at various points. Armorduct, Ltd., supplied the v.r.i. cable and J. A. Crabtree & Co., Ltd., the 5A switches, etc.

All electrical and mechanical engineering services were designed by Edward A. Pearce & Partners, the architect being Mr. Charles Pike, A.R.I.B.A., of Slater, Uren & Pike. The principal contractors were Gee, Walker & Slater Ltd., with Holliday, Hall & Stinson, Ltd., sub-contractors for electrical services, Ellis (Kensington), Ltd., sub-contractors for heating and ventilation, and Sound Diffusion Ltd., sub-contractors for the sound systems.

Electricity from Peat

WORK began in early August at Altnabreac in Caithness on the preparation of the peat bog site for a "power from peat" experiment. This project comprises three stages of construction; the first is that which has now begun, involving the preparation of the peat bog as a source of fuel and the preparation of that fuel for combustion. The second stage embraces the erection on a selected site at the edge of the bog of a suitable housing to shelter the two gas turbine units which are now being built. The third and final stage is the utilization of the peat to fire the turbines and the study, over a period, of the results achieved.

The project is essentially experimental in its conception and operation. It is not, at this stage at any rate, designed as a source of commercial power, although the power generated will be fed into the nearby grid. It is inevitable that there must be a period of adjustment and experiment, and that the ultimate shape of the project may be varied as a result of practical experience. Ditching and earthworking equipment was shipped to the site in mid-July, and for the next twelve months or so the major interest will lie in the preparation of the fuel. The suitability of peat as a fuel has been proved in the test runs on the plant already constructed, and the task facing the engineers now on this job is to bring the site, by draining and ditching, to a state which will permit the harvesting and drying of peat.

The construction of the power plant site will be timed to line up with the progress of the initial work. The gas turbines, which are now under construction, are closed cycle 2,000 kW machines of the type which John Brown & Co., Ltd., have been working on since 1947, and of the open cycle 750 kW plant on which Ruston & Hornsby, Ltd., have been working since 1948. A smaller gas turbine of the closed cycle type has been successfully run on peat. It has been described as virtually a hot-air turbine with a peat-fired boiler. The open cycle machine is regarded as having potential value where relatively small outputs are visualized, while the Clydebank machine is regarded as offering prospects of successful use where long term operations and larger outputs are visualized. Only by simultaneous operation of the two units on the same site and using the same fuel, can a direct comparison be made.

But it is equally certain that the work will provide data of major importance on the mechanical aspects of the development which will be of much greater importance than any immediate return in the form of generated power. The essential function of the project is to provide working experience under practical conditions in using indigenous fuel for the new power units; to permit adaptations and alterations as these are shown to be necessary; and to allow the interested sponsors to arrive at conclusions based on hard gained experience as distinct from test bed performance.

The North of Scotland Hydro-Electric Board is undertaking the Altnabreac Peat Development at the request of the Scottish Peat Committee, and will be responsible for the installation of the closed cycle machine of John Brown & Co.'s manufacture. The open cycle machine is sponsored by the Ministry of Fuel and Power, with financial support from the North of Scotland Board, but it will not be taken to Altnabreac until after the experimental stage.

Shortage of Science Teachers

Dunsheath Committee's Report

THE Committee on the Shortage of Science Teachers which was set up under the chairmanship of Dr. P. Dunsheath, C.B.E., chairman of the F.B.I. Education Committee, by resolution of a conference convened in January, 1954, by the Federation of British Industries, recently issued its report.

The Committee's terms of reference were: "To consider methods of improving the supply of science teachers to the schools with a view to (i) alleviating the shortage during the difficult years 1955–60 and (ii) finding a long-term solution to the problem, and to put forward recommendations to the appropriate authorities. With this end in view, to maintain and strengthen contacts between the universities, schools, industry and other employers of scientists." Broadly speaking, the Committee has been representative of the universities, schools, industry and other employers of scientists, but each member has served in a personal capacity.

The following are salient points taken from the report. The serious shortage of graduate teachers in science and mathematics threatens to get steadily worse, and unless some solution is found to the problem, large numbers of boys and girls will be leaving school deficient in scientific knowledge and handicapped in their understanding of the world around them. As an industrial nation we are completely dependent on the application of science. Our great industries employ large numbers of men and women whose everyday activities demand a knowledge of chemistry, physics, mathematics and the biological sciences. Without a knowledge of science and of the wide range of technologies based on science these people would be useless, and the industries would eventually come to a standstill.

Estimated Deficiency

There was already in 1950 a shortage of science teachers and little has been done since 1950 to make good the shortage of men teachers in the schools. The figures for the supply and requirement of trained graduate science teachers given in the report and set out in Table I ignore the 1950 shortage, and this should be borne in mind when comparing the estimated number of teachers available, with the forecast of requirements.

Table I.—Supply and requirement of trained graduate science teachers for grant-aided schools and establishments, 1950-60

	Men	Women	Total
Forecast of average annual requirements:			
1950–55	340	240	580
1955–60	630	390	1,020
1950–60	490	310	800
Estimated number available:			
1951–53	360	210	570
Average annual deficiency:			
1950–60	130	100	230
Accumulated deficiency:			
1950–60	1,300	1,000	2,300

There has been no comprehensive investigation of the demands of industry as a whole for science graduates and of the extent to which they have been met, but it is certain that the larger firms would have recruited more if graduates of the right type had been available. In the absence of evidence to the contrary it must be assumed that Table II represents very approximately the result of the competing demands of industry, Government service, the universities, technical colleges and schools, for science students graduating in 1953.

Table II.—First degree students in science and mathematics who graduated from universities and university colleges in England and Wales in 1953, analysed by occupations taken up

Percentage Distribution

	Teacher training courses and school or technical college teaching	Research or post-graduate courses and university teaching	Industry or commerce
Honours degrees (including general honours):			
Men	13	54	25
Women	36	29	24
Other degrees			
Men	43	9	33
Women	60	2	22
Totals:			
Men	18	46	27
Women	43	21	23

Note 1.—Most of the students following research or post-graduate courses at the universities will ultimately find employment in industry or Government service.
Note 2.—The remainder went mainly into Government service at home or overseas and nationalized industry.

It is important to discover why teaching is now much less attractive than before the war; the following reasons are believed to be valid:—The relative financial position of science graduates in teaching and in industry has worsened since the war, and to those seeking a professional career in teaching the disparity must be discouraging. The appeal of research is particularly strong for young science graduates, and there are now many more opportunities than there were before the war for them to undertake research in the universities, industry and Government service. The prestige of teaching as a career has on the whole declined, partly because of inadequate financial rewards and partly, in the case of grammar school teaching, because of the post-war changes in the educational system, which have affected the position of the grammar schools adversely. It would be unrealistic, and indeed misleading, not to give prominence to the question of financial rewards.

Comparative Rates of Pay

Information has been collected from six of the largest industrial employers of graduate chemists, who together, it is believed, employ more than half the graduate chemists in industry. If it is assumed that the majority of these chemists have good honours degrees, and compare their average rates of pay at the ages of 24, 30, 40 and 50 with the average rates of pay of assistant masters with good honours degrees and of headmasters, in maintained grammar schools, the following result is arrived at:

Table III.—Average rates of pay*

	Age			
	24	30	40	50
	£	£	£	£
Assistant masters with good honours degrees and headmasters (combined average)	612	800	970	1,010
Graduate chemists in industry	605	985	1,475	1,740

* Includes special allowances paid at the 1953 level to assistant masters.

These figures confirm the belief that there is too great a disparity between financial rewards for graduates in the teaching profession and in industry. The Committee is strongly of the opinion that the actual salary system is capable of substantial improvement and ought to be

changed at the earliest possible moment in order to provide greater incentives for the graduate science teacher. It is felt that special allowances do not possess the maximum incentive value which the situation demands because they are renewed on an annual basis and theoretically cannot be relied upon by the individual. Further there are wide discrepancies between the practice of one local authority and another in allotting such allowances. It is strongly recommended that special grades should be introduced and that special allowances should be discontinued. The underlying idea of this proposal is similar to that adopted a few years ago in technical colleges, where the introduction of grading has greatly improved the recruitment position both as regards quality and quantity. The proposals briefly consist of the establishment of four grades of assistant master with the possibility of promotion at any stage, as follows:—

Grade I.—Starting salary £580 for pass and 3rd class honours degree, and £620 for 1st and 2nd class honours degree at the age of twenty-four—advancing by £20 increments to £900.

Grade II.—A £50 increment on promotion and an annual advance of £25 to a maximum of £1,100.

Grade III.—An increment of £60 on promotion and annual increases of £30 to a maximum of £1,300.

Grade IV.—An increment of £80 on promotion and annual increases of £40 to a maximum of £1,500.

To adopt the scheme for graduate science teachers only is estimated to cost about £1½ million a year, but the Committee feels that this large sum is fully justified on the grounds of equity and vital national need. Should it be contended that the cost of the proposed scheme is prohibitive it is pointed out that the alternative to large expenditure is likely to be the gradual drying up of the source of scientific manpower and, ultimately, disaster for British industry.

Power for Aluminium Production

Inauguration of First Stage of Kitimat Scheme

THE first aluminium ingot was poured on 4th August at Kitimat, British Columbia, marking the completion of the first stage of the vast hydro-electric and aluminium smelting project constructed by the Aluminum Company of Canada, Ltd. (Alcan) on the Pacific coast of Canada. The historic event occurred in Canada's newest industrial area where the labours of 10,000 men and the investment to date of $275 million have subdued a mountain wilderness to harness its hydro-electric power and support an aluminium enterprise capable of fivefold expansion. The hydro-electric scheme was described in the *Electrical Review* of 26th March, 1954, but further particulars have since come to hand relating to the two 301 kV oil-filled cables which transmit power from the subterranean power house at Kemano through the 670 yd long tunnel to the terminal point of an overhead line which runs on to the electrolytic refining plant at Kitimat, 50 miles away. The cables were manufactured and installed by Pirelli-General Cable Works, Ltd.

In the inquiry stage it was obvious that the insulation would have to be very highly stressed if the dimensions and cost of the cable were to remain at a reasonable level, so it was decided that a maximum working stress of 305 V/mil (120 kV/cm) would be feasible provided a dielectric of nearly perfect quality could be ensured.

As an early move in avoiding wrinkling and creasing of the insulating papers a formula was obtained for estimating the exact tensions at which the papers in all layers should be applied. Then to ensure a high degree of dryness prior to lead sheathing, the cable was provided with an outer screen consisting of semi-conducting carbon paper interlocked with metallized paper. This presented a less impermeable barrier to drying than if metal or metallized paper screening tapes had been used. Further, the outer end of the cable run between the end of the tunnel and the commencement of the overhead line is subjected to extremely low temperatures in winter. At such temperatures the grade of oil normally used for cable impregnation would become considerably more viscous and handicap the hydraulic design of the installation. Accordingly an oil with a viscosity of about one third of the normal was used. Finally, new drying and impregnating tanks had to be installed to take the 12ft diameter drums on which the cable was wound, the cable being supplied in lengths of approximately 230 yards, the overall diameter being 3·83in.

In addition to an 85 deg C load cycle test at 232 kV to earth, the test requirements specified ten negative and ten positive impulses at 1,050 kV peak, and an a.c. test of 350 kV to earth for 24 hours, followed by 425 kV for 2 hours.

The cable was installed by pulling it along the tunnel from the outdoor switchyard end. As this necessitated the complete removal of the cable from the drums for the middle and innermost lengths, mobile pressure tanks were used during this operation and were taken along the tunnel continuously connected to the cable. The tunnel itself was blasted out of solid granite and it slopes downward from the underground transformer chamber to the outdoor switchyard, the difference in level between the ends being 36ft.

Preparing the conductor of the 301 kV oil-filled cable for a straight joint

NEW BOOKS

Design and Analysis of Industrial Experiments. Edited by Owen L. Davies. Pp. 636; figs. and index. Oliver & Boyd, 98, Great Russell Street, London, W.C.1. Price 63s.

This is essentially a book for specialists and one which should be studied rather than read. To make full use of the contents, the student preferably should have some knowledge both of statistics and of science. Although this volume is complete in itself, it is a sequel to the book " Statistical Methods in Research and Production " and reference is made to the first book in various sections.

The book has been published for Imperial Chemical Industries, Ltd., who have long recognized the benefits of sharing their knowledge of all subjects with the general public. Naturally, the text and particularly the examples savour of the chemical industry, but sufficient explanations are available to apply the text to general use.

In all experimental work, results are built up gradually, and in general this book investigates the amount of work to be done from the statistical viewpoint, that is, the number of observations and experiments necessary to obtain results within predetermined limits of accuracy when the data is subject to experimental error. Chapters cover the planning of comparative experiments, sequential tests, sampling and testing, Latin squares and block designs, factorial designs and a new approach to the determination of optimum conditions. The various tables of statistical functions will assist in the practical application of the methods described and to the student a full glossary of terms used should prove of considerable help.—C.M.H.

The Oscilloscope at Work. By A. Haas and R. W. Hallows, M.A. (Cantab.), M.I.E.E. Pp. 172; figs. 102 with 217 oscillograms. Published for *Wireless World* by Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Price 15s.

The cathode-ray oscilloscope is an instrument of remarkable versatility and diverse uses in many branches of electronics, but the user may not always be aware of all its possible applications. This book, originally published in France, is a practical guide to these applications, though having especial reference to radio and television receivers. It has been adapted for English-speaking readers and considerably enlarged by R. W. Hallows, and will prove invaluable to anyone desiring to get the best out of his oscilloscope.

An important feature is the wealth of oscillograms which help to make the book of such practical value. Numerous circuit drawings and other diagrams have also been provided to clarify the text. Although the book deals mainly with the uses of the instrument and correct interpretation of the oscillograms produced, it also contains much valuable information on oscilloscope circuits, construction and adjustment, while one chapter is devoted to explaining how it can be made to diagnose its own troubles when faults develop.

Principles of Mass and Flow Production. By Frank G. Woollard, M.B.E., M.I.Mech.E., M.I.Prod.E., M.S.A.E. Pp. 196; figs. 102. Published for *Mechanical Handling* by Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Price 25s.

The author of this book has had some 30 years' experience of mass and flow production engineering, having pioneered these techniques at the Morris motor works in the 'twenties and been closely associated with their rapid development since. Out of this wide experience has grown the philosophy set down in these pages. After defining the terms " mass production " and " flow production " the author briefly traces the history of this type of manufacture. He then lays down a series of basic principles that relate to the setting up of a flow production plant, and considers the implication of each in detail.

Flow production is frequently thought of as being suitable only for large and highly organized enterprises. The author stresses, however, that the methods can be applied with the same benefits to small quantities in small firms, and that large capital is not essential. As Mr. L. P. Lord says in the foreword he has contributed, the book " offers encouragement to the little firms to adopt the flow system wherever this is possible . . . and it is possible far more often than is generally believed."

The principles and methods described are suitable for the manufacture of almost every article that is readily and continuously saleable (or can be made so by skilful marketing) and production executives in a very wide range of industries, as well as all students of engineering economics, will find the book of considerable interest. Throughout, the text is amplified by photographs and diagrams of significant examples from this country, the U.S.A. and Europe.

Laplace Transforms for Electrical Engineers. By B. J. Starkey, Dipl. Ing., A.M.I.E.E. Pp. 280; figs. Published for the *Wireless Engineer* by Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Price 30s.

The method of solving linear differential equations originally published by Laplace has been in use by mathematicians for well over a century, but only in recent years have engineers begun to realize its usefulness to them. The Laplace transformation theory is, however, extremely helpful in providing quick solutions to a great range of engineering and physical problems, and often saving much laborious calculation by other methods.

Normally, the language used by mathematicians to present the theory is rather difficult for the engineer whose knowledge of higher mathematics may not go beyond the differential and integral calculus and the theories of complex numbers and vector analysis. In this book, however, the language used is well known to engineers in general, and the methods of explaining the problems is particularly familiar to electrical engineers.

A physical rather than a purely mathematical vocabulary is used in an attempt to attain the utmost simplicity, and throughout the approach is from analytical methods already well known to the reader. The work is not intended as more than a general introduction to a very large subject, but it will be of value in supplementing the more rigorously mathematical texts that have previously appeared.

BOOKS RECEIVED

Electric Traction. By A. T. Dover. Third edition. Pp. 441; figs. 325; index. Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, London, W.C.2. Price 60s.

Automobile Electrical Maintenance. By A. W. Judge. Third edition. Pp. 256; figs. 180; index. Sir Isaac Pitman & Sons, Ltd. Price 12s 6d.

Electronics. By T. B. Brown. Pp. 545; figs. and index. Chapman & Hall, Ltd., 37, Essex Street, London, W.C.2. Price 60s.

The Amplification and Distribution of Sound. By A. E. Greenlees. Third edition. Pp. 300; figs. 114; index. Chapman & Hall, Ltd. Price 35s.

Electric Accumulators. Edited by Bernard E. Jones. Pp. 158; figs. 62; index. Cassell & Co., Ltd., 37, St. Andrew's Hill, London, E.C.4. Price 4s 6d.

Electric Light and Power Installations. By E. T. Lawson-Helme. Pp. 176; figs. 122; index. Cassell & Co., Ltd. Price 4s 6d.

A Concise History of Mathematics. By Dirk J. Struik. Pp. 299; figs. and index. G. Bell & Sons, Ltd., 6, Portugal Street, London, W.C.2. Price 14s.

Junior Institution of Engineers

The Junior Institution of Engineers' address is now 14, Rochester Row, Westminster, S.W.1, and the telephone number Victoria 0786.

Engineering in Europe

Abstracts from Foreign Technical Journals

SYSTEMATIC measurements were carried out on 110 and 220 kV overhead line masts with various earthing arrangements while the masts carried fault currents, with a view to determining the possible reduction of the dangers to life achievable by special methods of earthing. The conditions vary a good deal as between rigidly earthed systems and systems the neutral of which is earthed through Petersen coils, systems with and without earth wires and, obviously, according to the differences of earth resistance, resistances of earth conductor and electrode and the various residual resistances. The types of earthing arrangements investigated were all 4-ray radial earths combined with annular earths, with and without " trefoil " arrangements. The fault conditions artificially produced corresponded to sustained single-phase short-circuits to earth in rigidly earthed systems. For these some interesting relations between body currents (as represented by the currents through suitable equivalent resistances) and the fault currents through the mast could be established which, for a certain range of values of body resistances and true earth resistances, represent a reliable measure of the dangers around overhead masts in certain fault conditions. Contact and step voltages on 110 and 220 kV masts were also measured, and the distribution of the points of maximum danger around the masts was found.—" Influence of Various Methods of Mast Earthing on Dangerous Voltages and Body Currents," H. Langer, *E.T.Z.* (*A*), Vol. 75, No. 11, pp. 373–379, 1st June, 1954, in German.

Transmission Line Icing

The 3–10 kV systems in the U.S.S.R. work with insulated neutral and the l.v. windings of the step-down transformers supplying the systems are delta-connected, whereas the transformers of the receiving-end substations are Y-Y-connected. The rated primary currents of the 3–10 kV transformers are of a much smaller order than the fusing currents required for ice coatings on conductors of the sections used for 3–10 kV lines. These facts and the large numbers of substations supplied by radial feeder spurs render it impossible to use the electric fusing methods actually practised on 35–110 kV lines for the 3–10 kV systems. However, a method suggested by the author originally for use on higher voltage systems is shown to be suitable for the 3–10 kV systems as well. It consists in the use of a special reactor producing a limited short-circuit current on the line with the ice coating which, together with the load current carried by the line, just corresponds to the fusing current required. In principle, it is possible to produce these conditions either as a two-phase short-circuit through the reactor or at various points of the line to be heated, or else at one of the line ends. The method is explained with reference to various circuits possible, vector diagrams of the currents and voltages involved and graphed relations between the conductor sections and impedance of the reactor required. The conductor sections suitable for the application of the method are also tabulated with the rating of the feeding transformer and a second table gives the reactor parameters for 3, 6 and 10 kV lines. The calculation of these parameters is shown in a numerical example.—" Melting Ice Coatings on 3–10 kV Transmission Lines by Means of a Reactor," G. B. Yakusha, *Elekt. Stantsii*, No. 3, pp. 31–34, 1954, in Russian.

Transformer Voltage Diagrams

The author proves that it is possible to calculate leakage inductances and leakage reactance drops of each transformer winding separately, although this is not the usual procedure and results in the case of transformers with cylindrical coils in a voltage diagram which differs slightly from the usual representation. On the other hand, it yields a correct representation of the internal conditions of a transformer on load.

The proposition is first proved in a general way and then in detail for a two-winding transformer with cylindrical coils of a given concrete design. It is then shown that the concept of resultant leakage fields of the two windings leads to essentially the same kind of voltage diagram although the case of a non-negligible magnetizing current can only be treated by the method suggested by the author.

Further considerations demonstrate that the method at first explained for the transmission ratio 1 : 1 also applies to any other transformation ratio and that it is also useful for induction motors or induction regulators with magnetization of the primary side, owing to the fact that their actual field configuration is reducible to the case of a transformer with cylindrical coils, despite the existence of an air gap. Yet it is found that these cases may be treated with sufficient accuracy by the usual method.—" The Voltage Diagram of the Transformer," R. Stix, *E.u.M.*, Vol. 71, pp. 149–153, 1st April, 1954, in German.

Radio Interference from H.F. Equipment

The German regulations VDE 0871/5253 stipulate the conditions of admission of electromedical (diathermy) and industrial h.f. heating installations for which the frequency bands 13,650 and 27,120 kc/s, 40·68 and 2,400 Mc/s are reserved. For this apparatus the disturbing field strength limit at 100 m distance is 225 μV/m and for apparatus operating on other frequencies 45 μV/m. Type tests are carried out by the Central Institute for Communication Engineering in Darmstadt and refer to design, output, operating voltages and currents, constancy of the frequency generated and also of the operating conditions and circuit parameters in general; the last for the reason that substantial, possible, variations may cause power amplifier (end) stages to generate and set up disturbances absent in normal operation. For this reason the mechanical construction of the apparatus is also tested. The disturbing field strength is measured on an elliptical testing ground 200 by 173 m. The apparatus tested is placed on a turntable and the measuring set-up comprises a frame aerial and measuring dipole. The tests consist of measurements of the radiated and the conducted disturbances, the latter obtained on a network model. Graphed results of tests on 144 types of apparatus so far commissioned, 94 of which are electromedical and 50 industrial apparatus, are presented, showing that the manufacturers succeed in general in keeping to the frequency bands allotted and also in remaining within the permissible interference limits, partly by incorporating suitable suppression gear in their apparatus.—" Testing the Radio Interference Effect of H.F. Heating Apparatus," G. Use, *E.T.Z.* (*A*), Vol. 75, No. 11, pp. 357–362, June, 1954, in German.

Readers who require accurate full translations of any of the articles abstracted in this section can be put into touch with the translators who will supply them at current rates.—Editors, *Electrical Review*.

VIEWS on the NEWS

By REFLECTOR

THE fears of a contributor to *Coming Events in Britain* Mr. Christopher Horton) about the possible effects of ydro-electric development upon the Highland scene were hared by a good many people. In the result the North of cotland Hydro-Electric Board has come out well, as Ir. Horton has discovered, in company with others. Vhere the dams and power stations are visible they are ced with local stone and blend with their surroundings. eferring to Glen Affric, the author expresses the opinion at " in many respects the drive up the Glen is even finer ow than it was before." This, of course, is not the first stance of man improving nature. If ever the Board ally branched out into landscape gardening I know of any places which might benefit from its attention.

* * *

The implementation of domestic electricity tariffs based on the number of rooms continues to pose some problems from time to time. Some while ago it was decided that one of the criteria of what was a chargeable room was whether it contained a window or not. I remember referring to the possibility of a return to such conditions as prevailed when the Window Tax was imposed at the end of the seventeenth century. Since then there have been various little difficulties about attics reached by removable ladders. The status of these, I understand, is decided individually, flooring and again windows being taken into consideration. One of the latest complications, however, seems to be that the presence of a sink in a room renders it " unchargeable." Are we now then approaching an era when houses will either have no windows or be full of sinks?

* * *

This year's Mayor of Dagenham is Mr. Alfred Haddock who is employed at the West Ham power station. In reporting this, *British Electricity* shows that Mr. Haddock has a good record of public service but it introduces a touch of bathos when it says:—

> " He recently flew to Belfast with a colleague to attend a conference of park superintendents, and so became the first member of Dagenham Council to fly to a conference."

* * *

Electric irons are probably the longest-lived of any electrical appliances. This is likely to prove troublesome to manufacturers who may be called upon many years after the sale of an iron to supply new parts. In " Carron Cupola," the magazine of the Carron Company, I read of a woman who sent a thirty-year-old iron back to the company because one of the connector pins had broken off; the rest of the iron remained in working order. The company not only replaced the pin but also re-plated the iron and added a thumb-piece and heel-rest (two refinements introduced since the iron was produced) and supplied a new handle. I would have thought it cheaper to supply a new iron (in any event thirty years' service is as much as a customer should expect), but such courtesy is admirable and was greatly appreciated by the owner of the iron.

* * *

A new kind of conference is to be held in Cleveland, Ohio, next March—a " Street Tree and Utility Conference," the purpose of which, says the *Edison Electric Institute Bulletin*, is

> " to study the need for a long-range program designed to evolve a plan whereby trees and utility installations may harmoniously occupy streets and highways."

The report goes on to say that invitations will be extended to all persons and groups interested in the subject, including " communication companies, state and municipal foresters, roadside engineers, arborists, professional tree-trimming organizations, and nurserymen." The idea of the conference is one which might be adopted here—the beautifying or preserving the beauty of public thoroughfares by making street furniture (as it has come to be called) conform to some form of æsthetic rules.

* * *

The *Nor'Easter*, the magazine of the North Eastern Electricity Board and the B.E.A. North Eastern Division, tells of a stoker at a power station in the area who while shovelling soot from a boiler flue was heard to remark:— " No wonder they give us dirty money for this job. You need a bath practically every week."

* * *

A great deal of fuss has been made by the lay Press about an account sent by the Eastern Electricity Board to a Braintree (Essex) firm. It is said to have read:—" Units consumed—0; total amount due—0." It was explained by a representative of the Board that it was less costly to let this account go than to stop it for the work is done mechanically. I can appreciate this, but what I wonder is whether, as the account cannot be paid, a reminder will be sent, mechanically, in due course.

* * *

The following note appeared in the *Electrical Review* of 9th August, 1884:—

> " On Thursday week, just previous to Dr. Lyons, M.P., beginning his lecture at the International Forestry Exhibition, a rather untoward accident occurred, writes a correspondent, in the explosion of one of the electric incandescent lamps, by which the lecture hall is lighted. Following the bursting of the globe of the lamp, a hissing flame suddenly issued from the metal bracket supporting it, and blazed, blow-pipe like, with such energy for some little time, that a portion of the bracket itself became detached and fell to the ground, fused by the heat, it was said."

This phenomenon may have been a sustained arc but there is also the possibility that the wiring for the lamp had been run in the gas piping and somebody had forgotten to turn off the gas.

PERSONAL AND SOCIAL

News of Men and Women of the Industry

IT was announced from 10, Downing Street on Tuesday that a viscounty of the United Kingdom had been conferred upon **Mr. Oliver Lyttelton,** who, as reported in last week's issue, has just resigned the position of Secretary of State for the Colonies.

The Minister of Fuel and Power has re-appointed **Lt.-Col. E. H. E. Woodward,** C.B.E., M.C., T.D., B.Sc.(Eng.), M.I.E.E., of Milford - on - Sea, Hants, as a part-time member of the British Electricity Authority. Col. Woodward has been a member of the B.E.A. since its inception in 1948.

Lt.-Col. Woodward

The Minister has accepted the resignation, on 30th September next, of **Lord Braintree,** a part-time member of the Eastern Electricity Board. Lord Braintree has informed the Minister that his other duties will make it difficult for him to continue on the Board.

At the request of H.M. Government, the **Federation of British Industries** has arranged for a civilian survey mission to be formed to study the problems connected with the future maintenance of the Suez Canal Base by civilian contractors. The leader of the mission, who will fly out this week, is Sir John Duncanson and among the members is Mr. K. C. Gresham, electrical engineer, Balfour Beatty & Co., Ltd.

Mr. G. Faraday Davies, M.I.E.E., sub-area engineer of the Merseyside and North Wales Electricity Board, No. 4/5 Sub-Area, retires on 24th August. Educated at the Old Grammar School, Bala, and Finsbury Technical College, Mr. Davies received his general training with various firms including J. S. Whites & Co., Cowes, the B. T. H. Co., Rugby, and the Western Electric Co., Woolwich. From 1912 to 1925, except during the war when he served with the Royal Naval Division Field Company and the Royal Engineers, he was with the South Wales Power Company, becoming operation and maintenance engineer for the whole area and finally personal assistant to Mr. C. T. Allan, the assistant manager. In 1925 he joined the North Wales Power Company as assistant transmission engineer. Following nationalization in 1948, he became deputy sub-area engineer in the No. 4/5 Sub-Area of the Merseyside and North Wales Electricity Board, and was appointed sub-area engineer in 1952. He served on the Committee of the Merseyside and North Wales Section of the I.E.E. between 1946 and 1949.

Mr. G. Faraday Davies

Sir Kenneth Clark, chairman of the Arts Council, has been appointed chairman of the new Independent Television Authority, and **Sir Charles Colston,** until recently chairman of Hoover, Ltd., is deputy chairman.

Mr. R. R. Kenderdine, M.I.Prod.E., has been appointed an executive director of Crompton - Parkinson, Ltd., as from 16th August. From this date he will assume full executive responsibility for the company's works both at home and overseas with the exception of those at Guiseley and Doncaster concerned with the production of lamps, tubes, and lighting fittings. These works will remain the responsibility of **Mr. R. E. P. Briebach,** who was recently appointed to the board of F. & A. Parkinson, Ltd. Mr. Kenderdine was appointed production engineer at the Chelmsford Works in 1949; subsequently he became chief production engineer of the company, and he will continue his duties in that capacity for the time being in addition to his new responsibilities.

Mr. R. R. Kenderdine

Mr. W. T. Cox, M.I.C.E., M.I. Mech.E., A.M.I.E.E., who has retired from the post of area chief engineer for the National Coal Board in Cumberland, has been presented with a gold watch by his colleagues. Mr. Cox was appointed area chief engineer when the mines were nationalized in 1947. His successor is **Mr. J. B. Tindale.**

The Eastern Area Final of the **Electrical Industries Benevolent Association's** national golf championship was held on 28th July at the Letchworth Golf Club. The successful competitors, who now qualify for the National Final, were Mr. A. G. Gray (Bletchley), Mr. C. O. Pilbeam (Luton) and Mr. J. R. C. Williams (Harpenden).

Mr. G. E. Hughes-Jones, who joined the Brush Electrical Engineering Co., Ltd., on the staff of its Leeds office last autumn, has been appointed manager of the company's Newcastle office.

Mr. C. R. King, C.B.E., chairman, East Midlands Electricity Board, recently presented long service certificates and cheques to **Mr. G. A. Adams,** commercial officer to the Burton District, and **Mr. W. P. Ringwood,** mains engineer, to mark the occasion of their fifty years' service. Mr. F. Overstall, manager of the Burton District, presided at the presentation dinner, which was held in the canteen of the Board's Burton District. Mr. Ringwood, who is to retire at the end of August, was also presented with a gold wristlet watch by members of the Burton undertaking.

Mr. J. Chamberlain, O.B.E., chief engineer, and **Mr. H. A. Blackwell,** manager of the Evaporator Division, have been appointed directors of Aiton & Co., Ltd. Mr. Chamberlain has been with the company since 1914 and Mr. Blackwell since 1921.

Mr. F. W. Whiting, B.Sc.(Eng.), A.M.I.E.E., has been appointed Lancashire Dynamo Group branch manager for the Nottingham area as from 1st September next. Mr. Whiting was educated at St. John's College, Hurstpierpoint, Sussex, and took an engineering degree course at Brighton Technical College. He then served a technical apprenticeship at the Trafford Park and Willesden Works of the L.D.C. and joined the company's London office staff as service and estimating engineer. In 1946, after war service, he joined the Nottingham sales office staff where he served as assistant to the area sales manager.

Mr. F. W. Whiting

OBITUARY

Mr. F. E. J. Ockenden.—The death occurred in Melbourne, Australia, on 31st July, of Mr. Francis Edmund Jury Ockenden, M.I.E.E., who was well known in this country, before going to Australia in 1948, as technical

director of Everett, Edgcumbe & Co., Ltd.

Mr. Ockenden received his general and electrical training between 1909 and 1913 at the Battersea Polytechnic, and after a brief period spent at Woolwich in the telephone laboratories of Siemens Bros. & Co., Ltd., served in the Army throughout the 1914-18 war. His association with Everett, Edgcumbe & Co. commenced in 1919, when he joined the company as research assistant. Later he took charge of the whole of the research and development work carried out by the company and he was appointed to the board in 1934. He went to Australia to take up the appointment of technical adviser to Watson Victor, Ltd., agents in Australia for Everett, Edgcumbe & Co.

Mr. Ockenden was joint author with Col. K. Edgcumbe (now the Earl of Mount Edgcumbe) of a paper on electrical measurements and instrument transformers read before the Institution of Electrical Engineers in 1927 and of "Industrial Electrical Measuring Instruments," published in 1933. He served as chairman of the former Meter and Instrument Section of the I.E.E. for 1930-40 and was a member of the Council of the Institution from 1935 to 1938. He was elected a Fellow of the Institute of Physics in 1933 and was the author of a number of papers dealing with the practical application of microscopical optics.

Mr. Evelyn F. Bacon, who before his retirement two years ago was district manager at Holmfirth in No. 2 Sub-Area, Yorkshire Electricity Board, died on 3rd August at the age of sixty-six. Mr. Bacon had been associated with the electricity supply industry for forty-four years. On leaving school he became an assistant engineer with the Leeds electricity undertaking and after the 1914-18 war became chief electrical engineer to the United Premier Oil combine. Six years later he went to Colchester as commercial manager and was appointed engineer-manager at Holmfirth in 1933. He held that position until nationalization when he became district manager at Holmfirth.

Mr. C. J. Cummins.—The death has occurred in Dublin of Mr. Christopher J. Cummins, A.M.I.E.E., a member of the firm of Cummins & Sons, which was established in 1867 and pioneered electrical engineering in Ireland.

Mr. Herbert Ashley Smith, assistant engineer (construction) with the Southern Electricity Board at Sherborne, has died at Yeovil at the age of fifty-four.

Mr. J. F. Peaker.—Formerly for some time assistant manager and mains superintendent with Chesterfield Corporation Electricity Department, Mr. John Frederick Peaker, of 5, Heathfield Avenue, Chesterfield, has died, at the age of seventy-four, while on holiday in Norfolk. He served an apprenticeship with Sheffield Corporation Electricity Department and after holding various posts in London returned to Sheffield. He then moved to Mansfield and Mexborough and went to Chesterfield in 1919.

Major G. R. Dain, C.I.E., who died on 7th August at the age of seventy, was formerly manager of the Calcutta Tramways Co., Ltd.

WILLS

Mr. R. W. Smith, managing director of Drake & Gorham (Wholesale), Ltd., first president of the Electrical Wholesalers' Federation, who died on 9th June, left £15,155 gross (£14,968 net).

Mr. J. K. McCraith, manager of the Lamp and Lighting Sales Department of the Newcastle office of the British Thomson-Houston Co., Ltd., who died on 21st Jauuary, left £2,128 gross (£2,028 net).

Mr. R. L. Hought, of Grimsby, formerly a director of T. Beadle & Co., Ltd., who died on 28th April last, left £13,943 gross (£13,245 net).

Mr. E. O. Pollak, sales manager of Smart & Brown (Engineers), Ltd., who died on 12th June, left £4,347 gross (£2,199 net).

Alderman F. J. Cowie, senior partner of the Caledonian Engineering Co., electrical contractors and general engineers, Bradford, who died on 3rd March last, left £16,037 gross (£15,816 net).

Mr. H. K. Beale, for some years chairman of the Birmingham Corporation Electric Supply Committee, who died on 4th February, left £97,421 gross (£96,408 net).

Netherlands Electrical Trade

ELECTRICAL imports into the Netherlands last year showed a small increase as a whole on 1952. The advance was attributable largely to greater quantities of radio receiving apparatus, notably from West Germany and Belgium; of wires and cables from West Germany; and of accumulators from Sweden and the United Kingdom. On the other hand there were substantial declines in imports of motors over 10 kg, transformers and convertors, and telephone apparatus, as shown in Table I.

Table I.—Imports of Electrical Equipment

Class of Goods	1953 Gld. (000)	Inc. or dec. on 1952 Gld. (000)
Motors, 10 kg or less ...	2,786	+ 683
From U.K.	1,471	+ 122
,, *West Germany* ...	524	+ 210
Motors over 10 kg	16,695	− 2,647
From U.K.	3,201	+ 743
,, *Belgium-Luxemburg*	2,626	+ 583
,, *West Germany* ...	6,769	− 1,313
Transformers, 10 kg or less ...	1,543	− 713
From Belgium-Luxemburg	749	− 897
,, *U.K.*	205	− 24
,, *West Germany* ...	327	+ 94
Static convertors over 10 kg	1,611	− 909
From U.K.	731	− 118
,, *West Germany* ...	391	− 450
Accumulators	5,645	+ 1,710
From Belgium-Luxemburg	912	− 199
,, *West Germany* ...	629	+ 64
,, *U.K.*	1,371	+ 849
,, *Sweden*	2,474	+ 908
Vacuum cleaners and parts ...	2,900	+ 1,325
From U.K.	875	+ 551
,, *Sweden*	987	+ 388
,, *West Germany* ...	951	+ 376
Electromedical apparatus other than tubes	4,163	− 857
From U.K.	487	− 405
,, *West Germany* ...	1,568	+ 3
,, *Italy*	664	− 366
Radio valves	18,645	+ 189
From Belgium-Luxemburg	6,727	− 825
,, *U.K.*	2,994	− 101
,, *West Germany* ...	2,768	+ 1,375
,, *U.S.A.*	2,778	+ 1,698
Radio receiving apparatus ...	55,361	+ 9,445
From Belgium-Luxemburg	40,752	+ 2,778
,, *West Germany* ...	10,974	+ 6,276
Telephone apparatus ...	17,620	− 5,776
From Belgium-Luxemburg	5,554	− 4,916
,, *Sweden*	6,417	+ 2,919
,, *Switzerland* ...	2,720	− 1,007
Insulated wires and cables ...	15,845	+ 2,745
From Belgium-Luxemburg	5,487	− 127
,, *West Germany* ...	5,587	+ 3,160
,, *U.K.*	1,962	− 394

Table II.—Electrical Exports

Class of Goods	1953 Gld. (000)	Inc. or dec. on 1952 Gld. (000)
Motors, 10 kg or less ...	1,394	+ 624
Ditto, over 10 kg	5,340	− 127
Convertors, 10 kg or less ...	3,049	+ 8
Vacuum cleaners and parts ...	10,338	− 860
M.f. lamps	25,476	− 3,524
Radio valves	72,820	+ 7,504
Radio receiving equipment ...	132,722	+ 21,684
Telephone apparatus ...	13,160	− 2,590
Loudspeakers, microphones, etc.	4,220	− 991
Current regulating and control apparatus	10,632	− 393

Table II shows the value of some of the principal electrical exports in 1953 with notes of increases or decreases on the previous year. Details of distribution are not available. Nor is the considerable total of hair cutters and clippers recorded. Trade as a whole showed a moderate increase. (10·56 gld. = £1.)

Early Electrical Appliances

AMONG the appliances illustrated in the article "60 Years Ago" which appeared in our issue of 30th July were an electric iron, a hot-plate and a panel-heater which, we are told by Crompton Parkinson, Ltd., can be seen in the Crompton Historic Collection at Chelmsford. This collection includes a wide and unique range of design records, machines, instruments, arc lamps and other apparatus which were the result of the inventiveness and enterprise of Col. R. E. B. Crompton (1845–1940). It is an excellent record of the development of a wide variety of electrical engineering products over nearly half a century. Crompton Parkinson, Ltd., would like to hear from anyone who knows the whereabouts of other Crompton domestic appliances shown in our 30th July issue or, indeed, the whereabouts of any historic Crompton equipment not already in the collection.

THE SOUTHERN AFRICA MARKET

A REPORT prepared by the Board of Trade Export Services Branch (Ref. E.S.B. 10700/54, Com/9155) on the market for heavy electrical equipment in South Africa states that no new orders for turbo-alternators are being placed and competition cannot, therefore, be gauged. Neither the Electricity Supply Commission nor the Johannesburg Municipality, however, expect to look outside the United Kingdom for their requirements. Local industry is laid out to handle production of motors of up to 500 h.p. and can give early delivery; local production has most of the market up to this size. Beyond it, requirements are generally met by imports though local manufacturers can make up to 2,000 h.p. There is not much foreign competition.

There is little local production of generators and little competition. The United Kingdom is the biggest supplier of power station switchgear, though some competition is experienced from America. The occasions when United States switchgear has been preferred to British have been when standard United States ratings have been suitable and United States firms have, therefore, been able to give very early deliveries at low prices. Price and delivery from the United Kingdom are generally regarded as satisfactory. Industrial switchgear is principally assembled locally from parts imported from the United Kingdom, sheet metal work being made locally.

There are seven manufacturers in the Union and they can handle transformers of up to 1,000 kVA, 33 kV, and one manufacturer has made units up to 3,500 kVA, but anything above 1,000 kVA is at present exceptional. The Electricity Supply Commission and the municipalities both give preference of up to 10 per cent to the locally-manufactured product and the Commission is understood to have found it extremely difficult to obtain import permits for transformers of up to 1,000 kVA, 33 kV. No difficulty arises, however, as regards import permits for transformers of higher capacity, but in the lower ranges it is the normal practice now to purchase locally. In the field of larger transformers, competition is mounting and recently eight foreign firms quoted lower prices than the lowest British price. For transformers in the 50/500 kVA range the general impression is that United Kingdom prices are fully competitive with those of foreign firms.

With the object of obtaining power from Belgian Congo sources for the copper belt in Northern Rhodesia in the period 1956/57, a very big project is now in hand for the provision of a 220 kVA transmission line, about 320 miles in length. Although the supply of transmission towers is in the hands of an Italian firm who have a most aggressive and efficient sales organization and have been able to offer a two months' delivery, virtually all the equipment being used for transmitting power from the Belgian Congo to the Copperbelt (on the Rhodesian side) has been ordered from the United Kingdom. Continental firms are avid for orders and have gone as far as to cut their quotations on the same machines by as much as 30 per cent at an interval of one year. They will even take on business when little or nothing in the way of profit can be made, merely in order to keep their plant in action and their labour force together.

The Kafue scheme for harnessing water power in Northern Rhodesia is one of the biggest projects of the kind in Africa and will cost about £30 million, of which £15 million will be spent on waterwheel turbo-alternators, large transformers (probably of 220 kV rating), switchgear, synchronous condensers, transmission line material and steel cored aluminium conductors, etc. Tenders are unlikely to be invited before the end of 1954.

The local branches and agents of British firms are on excellent terms with buyers and have a big lead over competitors because so much of the plant in use is British. There are, however, signs of danger, particularly in the transformer field. Competitors are quoting lower prices and some of their prices are firm. Foreign deliveries are usually also more favourable than those from Britain. The practice of introducing into quotations a price variation clause is very much disliked: it has been pointed out by buyers that certainty about price is more important to Government, quasi-Government and municipal buyers than a possible gain on the price variation clause.

BELGIAN IMPORTS AND EXPORTS

LAST year Belgian import trade in electrical goods was slightly greater in value than her export business. The total values were: Imports, 3,360 million Belgian francs (an advance of 156 million francs on 1952), and exports, 3,322 million francs (a decrease of 368 million francs). The accompanying tabular statement shows the trend of distribution of Belgian external electrical business as a whole. It will be noticed that the Netherlands is the largest customer and also, after West Germany, the most important supplier. The Belgian Congo remains an outstanding market, although showing a distinct decrease on 1952.

	1953 B. fr. (000)	Inc. or dec. on 1952 B. fr. (000)
Exports—		
Total	3,321,873	− 368,000
To West Germany ...	38,414	+ 9,197
,, France	174,994	− 22,502
,, Netherlands ...	918,482	− 59,664
,, U.K.	9,993	− 2,031
,, Belgian Congo ...	544,483	− 186,359
,, U.S.S.R.	304,557	not available
,, Brazil	8,550	− 235,280
Imports—		
Total	3,360,000	+ 156,000
From West Germany...	890,652	+ 160,771
,, France	341,498	+ 7,038
,, Netherlands ...	741,786	+ 50,300
,, U.K.	411,708	+ 33,766
,, Switzerland ...	253,045	− 114,687
,, U.S.A.	509,426	− 11,500

Noteworthy among imports last year were motors above 10 kg. to the value of 320 million Belgian francs with West Germany the principal supplier; vacuum cleaners and similar electro-mechanical apparatus, 203 million francs, largely from the United Kingdom; starting, lighting and signalling apparatus for motor vehicles, 263 million francs (U.S.A. predominant); while the Netherlands headed the trade in telephone apparatus and radio valves.

On the export side motors over 10 kg appear to the value of 331 million Belgian francs, with the Congo the best customer; cable and wire, 799 million francs to various destinations; radio apparatus 447 million francs, and other telephone apparatus 398 million francs, both principally from the Netherlands. (140 Belgian francs = £1.)

EXPORTS TO PERSIA

WITH the announcement on 5th August about the accord on points of agreement which has been reached in the negotiations concerning Persian oil, it is expected that there will be fresh opportunities for United Kingdom firms to supply goods and services needed by the Consortium and the National Iranian Oil Company. Exporters requiring specific information about exports to Persia should get in touch with the Commercial Relations and Exports Department, B.O.T., Horse Guards Avenue, London, S.W.1 (telephone: Trafalgar 8855) and, where appropriate, to Export Licensing Branch, B.O.T., Atlantic House, Holborn Viaduct, London, E.C.1 (telephone: City 5733).

LETTERS TO THE EDITOR

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents

ocial Service

OUR contributor " Reflector " takes me to task (*Electrical eview*, 6th August) for the statement that " We have not ached the stage where electricity is a social service." o doubt you will allow me a little of your space, therefore, t justify what I said.

I have been connected with the electricity supply in dustry for the past quarter century and no one is more p oud of its development and of the service provided, but w ile undoubtedly electricity is a powerful factor in the so ial well-being of the country, the term " social service " h s a rather special meaning which must exclude the b nefits derived from such services as transport, and gas an d electricity supplies. To me, and to thousands of ot ers, those two words imply a service for the public w ich is paid for from the public purse, even though co tributions towards it are received from the individual m mbers of the public. The special feature of a social se vice is surely that the cost is borne on a rough basis of ab lity to pay, whereas transport, electricity and gas are pr vided on a cost basis.

t was because of this fact that my Council, when appeals ha e been made for preferential tariffs for low income ea ners, has not been able to recommend the Board to giv e consideration to the financial stringency or even po erty of consumers when designing its tariffs. That doe s not mean, of course, that the Council does not rec gnize the social needs of persons in the very low income groups.

The English language is a living thing and words have a habit of changing their meaning, almost imperceptibly, perhaps, over the years; " social service," therefore, as I understand the term, cannot be applied to the supply of electricity.

Wherstead, Ipswich. W. J. BENNETT,
Chairman,
Eastern Electricity Consultative Council.

BRITISH ASSOCIATION MEETING

THE British Association for the Advancement of Science will this year hold its annual meeting at Oxford from 1st to 8th September, under the presidency of Dr. E. D. Adrian, O.M., P.R.S.

The first general assembly of members will be held in the Sheldonian Theatre on the evening of Wednesday, 1st September, when Dr. Adrian will deliver his presidential address on " Science and Human Nature." The inaugural meeting will be preceded by a Convocation of the University of Oxford when the Vice-Chancellor of the University, Sir Maurice Bowra, M.A., D.Litt., will confer the honorary degree of Doctor of Science on Sir Ben Lockspeiser, K.C.B., F.R.S., Sir John Lennard-Jones, K.B.E., F.R.S., and Sir Harold Spencer Jones, F.R.S. The Vice-Chancellor of the University and the Mayor of the City of Oxford, Alderman W. F. Gowers, M.A., will welcome members of the Association to Oxford.

The sectional meetings will run concurrently from 2nd September. Sir John Cockcroft, K.C.B., C.B.E., F.R.S., is president of Section A.—Mathematics and Physics; Sir John Lennard-Jones, K.B.E., F.R.S., is president of Section B.—Chemistry; and Dr. Willis Jackson, F.R.S., is president of Section G.—Engineering.

Electrical engineers will be interested particularly in the meetings and discussions of Sections A and G, and the following are the principal papers in these sections: " Recent developments in nuclear physics," by Sir John Cockcroft; " Semi-conductors, transistors and photo-cells," by Dr. R. A. Smith; " Magnetism at low temperatures," by Dr. A. H. Cooke; " Low temperature aspects of nuclear orientation," by Dr. N. Kurti; " The evolution of numerical forecasting methods and the use of high-speed electronic computers in forecasting," by Professor C. G. Rossby; " The nuclear physics of thermal reactors," by Mr. P. A. Egelstaff; " The mechanics of neutron spectrometry," by Mr. E. R. Wiblin; " Rock magnetism," by Professor P. M. S. Blackett, F.R.S.; " Magnetization of rocks," by Dr. S. K. Runcorn; " Reverse permanent magnetization in rocks," by Dr. G. D. Nicholls; " Efficient industrial steam generation," by Mr. D. C. Gunn; " The effect of new materials on engineering progress," by Dr. Willis Jackson, F.R.S.; " Some combustion problems of the dual-fuel engine," by Mr. J. R. Simonson; " Transistors," by Mr. G. King; " Dynamic behaviour of the self-excited series transductor with direct current output," by Mr. D. W. Harvey; " The yield point in steel," by Mr. G. Murray; " The status of the engineer in management," by Mr. Bosworth Monck; and " The cross-Channel power cable," by Mr. F. J. Lane, C.B.E.

PROGRESS OF BRAZILIAN SCHEMES

From Our Rio Correspondent

THE Sao Paulo State Government's programme of thirteen hydro-electric stations will raise the plant capacity by 2,420,000 h.p., exclusive of any increases planned by private enterprise. Construction of the Salte Grande station (95,000 h.p.) is well advanced. Contracts for building and equipping the Euclides da Cunha station (132,000 h.p.) on the Pardo River were signed in June. Two others will be built at Gramacho and Limoeiro, in the same valley, with a joint potential of 100,000 h.p. The project for a 140,000 h.p. plant at Jurumirim has been approved and plans for those at Capivari (75,000 h.p.) and Barra Bonita (100,000 h.p.) are now being prepared.

The Rio de Janeiro State Government has organized a joint stock company, Empresa Fuminense (EFE) to take over the concessions, electrical installations and supply companies under State control. The Government will subscribe 110 million cruzeiros (£2,200,000) in properties and cash to the initial capital of 120 million, the balance to be offered to the public. The properties include the Macabu, Glicerio, Tombos, Madalena and Varre-Sai stations, already operating but to be enlarged in some cases, with substations, transmission lines, workshops, etc. The stations supply electricity to Campos, Novo Friburgo and a number of other municipalities, the annual production being estimated at 70 million kWh.

The investments of Centrais Electricas de Minas Geraes (CEMIG) and its four subsidiaries have increased from £330,000 in 1951 to £18,532,000 in 1953. Loans of 200 million cruzeiros (£4,000,000) and U.S.$15,916,000 have been obtained, respectively, from the Brazilian Bank for Economic Development and the World Bank. The hydro-electric stations at Itutinga, Tronqueiras and Piau should begin operating this year.

The Parana Electrification Fund is financing the building and equipment of power plants at Capivari Falls (78,000 kW), Sao Joao (7,600 kW) and Figueira (20,000 kW), the last being a thermal station. Stations at Imbituva and Foz do Iguaçu have begun operating, a diesel-electric plant at Maringa is about to start, and work is well advanced on hydro-electric stations at Caiacanga and Cavernoso.

The Goias State Government has accepted the tender of Société de Grands Travaux de Marseille to build and equip a 50,000 kW station at the Dourada Falls. The equipment must be delivered within 24 months, to be paid for in annual instalments spread over five years.

Colliery Winder

Large Installation for British Coal Mine

A NUMBER of large Koepe winders were ordered by the National Coal Board for its post-war electrification schemes, and the first to be ready for service is a 3,720 h.p. installation at No. 2 shaft, Bradford Colliery, Manchester. This equipment, which is of the ground geared type with Ward-Leonard control, was supplied and installed by the Metropolitan-Vickers Electrical Co., Ltd., as main contractors, the major mechanical portions being manufactured by the Fraser & Chalmers Engineering Works (G.E.C.) and the gears by David Brown & Sons, Ltd.

The equipment is designed for winding from an ultimate pit depth of 3,822ft which will be reached in three stages, each stage having a life of about 30 years. The first and second stage depths are 2,802ft and 3,312ft. Two 12 ton skips and, for the first stage, a 2¼in diameter locked-coil rope, will be used. The weight of the skip and chains is 14·5 tons. The output per hour from all stages is 400 tons.

The Koepe wheel has a diameter of 24ft, and the maximum speeds for the three stages are 30 r.p.m., 35·5 r.p.m., and 41 r.p.m. The single reduction gears have a speed ratio of 8·68 to 1. The two winder motors have the following full speeds: stage 1, 260 r.p.m.; stage 2, 308 r.p.m., and stage 3, 357 r.p.m. The motors are coupled to the pinions by Bibby type flexible couplings. The main spur gear wheel is on the same shaft as the Koepe wheel, and the whole is mounted on three pedestal bearings. The wheel tread material is elmwood.

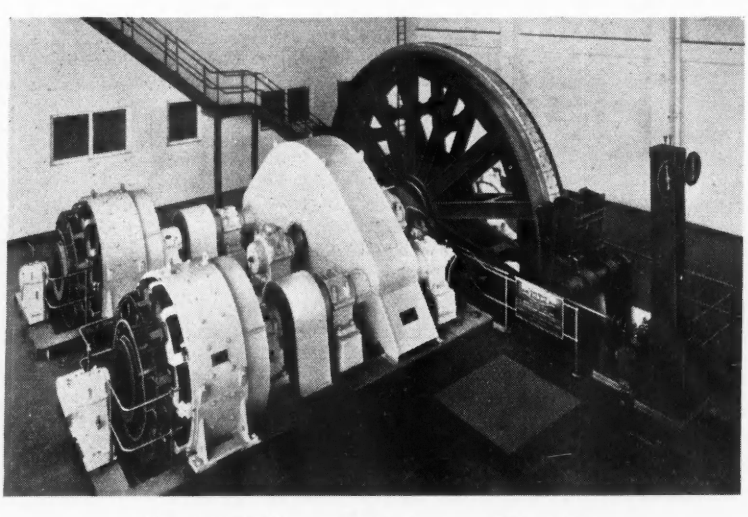
The driver's control cabin is situated on a platform in line with the Koepe wheel and contains a driver's desk and trip-indicating panel. On the winder house floor are mounted the Ward-Leonard control panel, the A.T.M. signal relay cabinet, and the MV mine hoist recorder.

To assist in rope installation and changing, a 300 h.p. winch is provided having a single plain cylindrical drum driven by a slipring induction motor. This winch is in the headgear structure and is controlled from an adjacent driver's platform. The switchgear and liquid controller for the winch are outside the air-lock in a room next to the winding engine room.

The winder motors are supplied from a motor-generator set situated in the power house, which is a separate building housing three turbo-compressor sets, the motor-generator sets for Nos. 1 and 2 winders, and the colliery substation, the whole of this equipment being supplied by Metropolitan-Vickers. The m.g. set for this winder consists of a 3,070 h.p. 750 r.p.m. 6·6 kV synchronous induction motor directly coupled to two generators, electrically interconnected with the winder motors, the d.c. voltage of the system being 660 V r.m.s. The Ward-Leonard m.g. set exciter is a 23·3 kW 220 V machine overhung at the opposite end of the m.g. set.

The winder motors have the following ratings: 3,720 h.p., continuous r.m.s.; 6,000 h.p., normal working peak; and 8,600 h.p., peak torque for rope-changing duty. The electrical control scheme is on the standard open loop system. In total, twelve 1·0 sq in section cables are installed between the motor-generator house and the winder, i.e., three cables per leg of the connection.

This is believed to be the first Koepe winder to be installed in Great Britain since 1927, and the biggest so far completed for a British coal mine.



The Koepe winder equipment in course of installation

Technical Courses

The prospectus for 1954–55 of the Department of Electrical Engineering and Applied Physics of the South East London Technical College, Lewisham Way, S.E.4, is now available with particulars of special short courses of lectures in various branches of electrical engineering. Information is also available of a new course, arranged by the City and Guilds of London Institute, designed specifically to meet the needs of the craft apprentice, technician or craftsman engaged in light precision engineering or instrument making.

The prospectus for the 1954–55 session of the Department of Electrical Engineering, College of Technology, Birmingham, Suffolk Street, Birmingham, 1, is now available. The enrolment dates are 6th to 10th September.

Cable Ship Completed

Swan Hunter and Wigham Richardson, Ltd., have completed the 2,500 tons d.w. cable ship *Recorder* built for Cable & Wireless, Ltd. The vessel on trials reached a speed of 13½ knots. The new ship, which was completed some weeks ahead of schedule, can carry 420 miles of deep-sea cable and, stationed at Singapore, will be responsible for the maintenance of about 20,000 miles of undersea cable in the Pacific. While the *Recorder* was being fitted out in the water, her hull was protected from corrosion by the use of special alloy anodes. These were placed in the water around the vessel and set up an electric current which overcame corrosive tendencies. When the vessel was docked before trials, there were no signs of corrosion on the hull.

Heating and Ventilating Engineers

A meeting of the Institution of Heating and Ventilating Engineers will be held on 14th September at the Institution of Mechanical Engineers when Mr. J. K. M. Pryke, consulting engineer, of New York, will present a paper on "Current American Practice in Heating, Ventilating and Air Conditioning."

Public Lighting Improvements

N Burgess Road, SOUTHAMPTON, the riginal lamp standards on one side of the oad have been replaced by new centrally uspended lanterns providing Class "A" lumination. In the Revo C.13660 cut-off ttings, which house 140 W sodium dis- harge lamps, absolute cut-off is obtained s that no light is admitted above the rizontal. The clear glass panel in the ver portion of the lantern provides full otection from dust and insects, and the ver portion is also hinged so that access to the interior is readily obtained by releasing two toggle action fasteners. The unit has a cast aluminium canopy and ends, with vitreous enamelled reflector and sides of sheet aluminium. The accompanying photograph of the installation was taken by courtesy of the Southampton borough engineer and surveyor, Mr. F. L. Woldridge, M.I.C.E., M.I.Mun.E.

The British Thomson-Houston Co., Ltd., has received an order for the supply of lanterns, control gear and lamps for a three-mile extension of the BARRY street lighting scheme, the first stage of which was completed last summer. The installation will consist of 143 "Mazda" sodium enclosed lanterns together with 24 cut-off units and all the necessary control gear and lamps. With this new extension the scheme will cover more than seven miles of Group "A" roads. The South Wales Electricity Board are the erection contractors.

During the past year an additional 16½ miles of streets in NOTTINGHAM have been lit by electricity, including nearly seven miles in which the lighting has been converted from gas. Schemes for improving the lighting in Middleton Boulevard and Western Boulevard have been approved.

Tenders are to be obtained by DARLINGTON Corporation for street lighting on the Branksome estate. The estimated cost of the work is £4,326. Sanction has been received to borrow £5,140 for the lighting of Coniscliffe Road, Darlington, and £1,035 for lighting the approach road to the new Hummersknott Girls' High School.

CANTERBURY City Council is applying for sanction to borrow £4,250 for installing mercury discharge lamps in Sturry Road, Union Street and Military Road.

MAIDENHEAD Corporation proposes to invite tenders for fluorescent lighting along the A.4 loop road, part of Forlease Road and the whole of York Road and Grenfell Road.

WELLINGBOROUGH U.D.C. has approved a scheme, estimated to cost £8,500, for converting 95 street lamps from gas to electricity.

RUTHERGLEN Corporation has approved a scheme, estimated to cost £30,588, for the conversion of street lighting from gas to electricity, within the next two years.

CHELTENHAM Highways Committee is to seek the approval of the divisional road engineer, Ministry of Transport, to a scheme for improving and extending the lighting (sodium lanterns) along the Gloucester road at a cost of approximately £6,430.

New lighting installation in Burgess Road, Southampton, with (inset) one of the Revo C.13660 cut-off fittings

When CAMBERWELL Council applied some time ago for £25,000 loan sanction for a sodium lighting scheme the amount allowed was cut to £15,000. The Minister of Transport has now intimated that the Council may proceed with the full scheme.

The second stage of BUXTON's scheme for the conversion of street lighting from gas to electricity has been approved by the Ministry of Transport.

Trunk road lighting at DORCHESTER is to be improved at a cost of £4,358.

Sodium lighting is to be installed along three miles of main thoroughfare at SUTTON, Surrey, at a cost of £10,300.

SCUNTHORPE Town Council is to spend £9,720 on the second part of its three-year street lighting improvement scheme.

MIDDLESBROUGH Town Council is to replace the existing obsolete gas lighting in Albert Road and the Exchange. The cost will be £4,223 including an estimate of £863 from the North Eastern Electricity Board for electrical services.

BLYTH Town Council is to complete this year the second stage of a three-year plan for improving the town's street lighting system. This year's programme is costing over £8,000.

MIDDLETON Corporation is recommended to seek sanction to borrow £15,821 for providing street lighting on the Langley estate.

PENRITH U.D.C. has agreed to proceed with a fluorescent lighting scheme for the trunk road. The Ministry of Transport stated that a 50 per cent grant would be given towards the cost of sodium lighting, but if fluorescent lighting was decided upon the extra cost would not rank for grant.

ROCHDALE Corporation is recommended to seek sanction to borrow £3,885 for sodium lighting in various streets.

SCARBOROUGH Town Council has received loan sanction for £8,089 for installing electric lighting in a number of streets at present served by gas.

The Ministry of Housing and Local Government has approved a loan of £4,115 for conversion of street lighting to electricity at KINGSWOOD, near Bristol.

DORCHESTER Corporation is to submit for the approval of the Ministry of Transport and Civil Aviation a scheme, estimated to cost £4,358, for the installation of improved street lighting on the trunk road.

POWER SUPPLY IN SWITZERLAND

DURING the hydrological year 1st October, 1952, to 30th September, 1953, electric power production in Switzerland totalled 13,407 million kWh, 5 per cent more than in the previous year. Consumption, exclusive of supplies for electric boilers and pumps, aggregated 11,474 million kWh, an increase of 3·1 per cent. The accompanying table shows the rate of growth of electricity consumption (1930–31 = 100).

Year	Domestic and trade	Industrial (boilers excluded)	Railways	Total (losses incl.)
1930–31	100	100	100	100
1940–41	150	162	150	153
1949–50	310	209	168	233
1950–51	344	262	185	271
1951–52	373	277	193	290
1952–53	402	276	202	298

In the winter half-year of 1952–53 there was a surplus of exports over imports of 41 million kWh, and in the summer half a surplus of 972 million kWh. Export surpluses, in proportion to the total output, have declined from 20 per cent in 1930–31 and 1940–41 to 7½ per cent in 1952–53. From the beginning of November, 1953, to April, 1954, Switzerland had to purchase power from abroad. Output of hydro-electric plants is at present covering the country's needs, and completion of stations now under construction will gradually reduce the possible power deficit. New investments in power stations (in million Swiss francs) have been as follows:—1946, 50; 1947, 115; 1948, 120; 1949, 140; 1950, 170; 1951, 270; 1952, 300; and 1953 approx. 300. Large investments will continue to be made during the next few years but it is expected that some time will elapse before the country's needs will be fully met.

INDUSTRIAL NEWS

Lyons' Strike Ended

After unsuccessful attempts had been made by the Ministry of Labour last week to settle the strike of electricians employed by J. Lyons & Co., Ltd., Mr. W. C. Stevens, secretary of the Electrical Trades Union, advised his members on Saturday last to resume work because it was felt that no useful purpose would be served by continuing the strike. Attempts should be made to resolve the dispute by other methods. Although the Union said that there was a "substantial" minority against a return the men returned to work on Monday.

The cause of the strike was the employment by J. Lyons & Co. of a man who terminated his membership of the E.T.U. upon being appointed a supervisor and refused to rejoin the Union. The strike has been in progress since 21st April but about a third of the original strikers had already resumed work.

Siemens Fluorescent Lamps

Siemens Electric Lamps & Supplies, Ltd., announces the release of improved natural fluorescent tubes. Whilst the colour rendering properties of this type of lamp have been carefully retained, the improved "Sieray" natural fluorescent tube gives 16 per cent more light than previously obtainable. The prices of the new lamps are the same as those of ordinary tubes, and they are available in the usual standard sizes.

Overhead Conveyor System

Particulars of a "P.C.P." light conveyor system installed recently in the transformer winding department of A. Reyrolle & Co., Ltd., Hebburn, Co. Durham, have been received from Geo. W. King, Ltd., Stevenage, the makers of the conveyor. The installation consists of two single overhead chain conveyors and an elevator, and it is claimed that it has resulted in a marked improvement in production from the same floor space and the same number of operators. The reorganization included alterations to the methods of issuing materials and the installation of new benches and equipment.

The "P.C.P." chain conveyor is supplied in parts ready for erection. Components are ready-drilled; patent hangers have swivel attachments that enable them to be fixed at any angle. The only tools needed for installing the conveyor are a hacksaw, a spanner and a clamp. The rated load capacity of each trolley is 100 lb; heavier loads can be provided for by special arrangement. The conveyor is very flexible; vertical bends of up to 90 deg and horizontal bends of 1ft radius (normally 2ft radius) can be supplied.

New conveyor system in Reyrolle's transformer winding department

National Display Convention

The National Display Convention and Exhibition will be held in the Old Horticultural Hall, Westminster, from 20th to 23rd September. Details are obtainable from the Organizer, 16, West Central Street, London, W.C.1.

"Class H" Transformers

The first consignment of a contract for 500 kVA, 11 kV T.W. dry type air-cooled distribution transformers with all-silicone impregnated insulation, using only Class H material, was recently dispatched from the works of Transformers (Watford), Ltd. This is claimed to be the first delivery of this type of transformer so far made in this country.

Consignment of Watford transformers with all-silicone impregnated insulation

East Midlands Board Handbook

A 48 page handbook containing details of personnel, areas of supply, etc., has been received from the East Midlands Electricity Board.

Prices of Materials

In the accompanying table we give the basis prices of the more important materials used in the electrical industry. The figures given are the selling prices and are those quoted on Tuesday last.

ALUMINIUM Ingots	ton £156 0s 0d
COPPER, H.C. Electro	ton £234 10s 0d
Fire Refined 99·70%	ton £233 0s 0d
Fire Refined 99·50%	ton £232 0s 0d
COPPER Tubes ..	lb 2s 3½d
Sheet	ton £295 15s 0d
H.C. wire and strip ..	ton £264 5s 0d
LEAD, English ..	ton £94 15s 0d
Foreign	ton £93 0s 0d
MERCURY	flask £100 0s 0d
TIN, block (English) ..	ton £729 0s 0d
ZINC, G.O.B. Foreign	ton £74 15s 0d
Electrolytic	ton £82 0s 0d
BRASS Tubes (solid drawn)	lb 1s 10½d
Sheet	ton £242 5s 0d
Wire	lb 2s 6d
PHOSPHOR BRONZE Wire	lb 3s 9½d
PLATINUM	oz £30 0s 0d
RUBBER, No. 1 R.S.S. spot	lb 20d–20½d

The "Grid"

Oldham & Son, Ltd., have adopted a new method of conveying to shareholders the latest information about their activities and recent developments overseas. Together with the annual

report and accounts for the year ended 31st March last a copy of the company's house magazine, the "Grid," has been sent to every shareholder. It is a special issue devoted entirely to the overseas expansion of the company since the end of the last war. In addition to being sent to every shareholder the magazine goes to all employees at Denton, those working in the overseas factories, to distributors and agents in over 100 countries and to the technical staffs of the company's main customers—a total of some 20,000.

Appliances for Canadian Exhibition

One feature of the Canadian National Exhibition, Toronto (27th August–12th September), will be a "prestige" display of well-designed British goods arranged by the Board of Trade and the Council of Industrial Design. Among the 500 products selected by the Council for this display are a number of electrical appliances and fittings, including an automatic electric cooker (No. 2011, English Electric Co.), a suction cleaner, floor polisher and scrubber (Fillery's (Great Britain), Ltd.), a Morphy-Richards heat-controlled steam and dry iron, an S.R.1 space heater (E. K. Cole, Ltd.), a Hoover 612 electric cleaner, a "Coldrator" CT33 refrigerator (International Refrigerator Co., Ltd.), electric wall clocks by Gent & Co., Ltd., and Smith's English Clocks, Ltd., and a number of lighting fittings including a floor standard and wall lamp by Troughton & Young, Ltd., and a pendant fitting by the Merchant Adventurers of London, Ltd.

Travelling Showrooms

As an experiment the South Western Electricity Board is taking three mobile showrooms out to housing estates, rural villages and agricultural shows which are at a distance from the permanent service centres in the towns. Three second-hand single-deck buses have been converted into mobile showrooms, complete with electrical appliances and cash desks for the payment of accounts. One of these mobile centres is at present at Hartcliffe Housing Estate, Bristol. The equipment includes fluorescent lighting, an electric cooker, a washing machine, refrigerator and small appliances, all working. The electricity supply is taken into the vehicle by tapping a l.v. line or by the use of a mobile generator. The vehicle is equipped with complete electrical and pressure water systems. Above the sink unit is a 3 gallon heater supplying hot water; an electric fan keeps the interior of the vehicle cool during hot weather; and there are twelve power points. The other two travelling showrooms, similarly equipped, are at present operating in the Bath and Plymouth areas. The experiment has shown that this type of vehicle can be purchased, overhauled and equipped by the Electricity Board's own staff at a cost of about £400, as compared with at least £2,500, the price of a new mobile service centre.

Industrial Fuel Efficiency

The new National Industrial Fuel Efficiency Service is to launch a campaign in Scotland to publicize the scope of the new body and its readiness to assist industrial fuel users. This new Scottish Committee takes over from the Scottish Fuel Research Committee. There has been some reorganization on commercial lines but fundamentally the service remains the same in function, personnel and policy. A summary of facilities has been prepared for interested industrialists and is available at 145, St. Vincent Street, Glasgow. Many of the services are free, others are on a fee basis.

E.I.B.A. Annual Meeting

The annual meeting of the Electrical Industries Benevolent Association is to be held at the Institution of Electrical Engineers on 22nd September (11 a.m.)

Board's Installation Charges

At the Tunbridge Wells County Court recently the South Eastern Electricity Board sued Mr. E. Munroe, of Stonegate, for the cost of installation work which it had carried out. Judgment was given in the Board's favour for £14 3s, with costs.

Mr. Munroe said that he was willing to pay but thought that he had been overcharged. Mr. H. P. Courtney, a member of the Board's staff, said that the charge was reasonable; it included an "on-cost" of 50 per cent of the wholesale cost of material and labour, which was normal. He also said that in the case of the Kent County Council

A window display at the Leeds Service Centre of the Yorkshire Electricity Board showing a tie-up between the Creda "Star" cooker and a star career in the R.A.F.

One of the South Western Electricity Board's travelling showrooms

an "on cost" of 40 per cent was included.

Judge Glazebrook thought the charges were rather high and that the Board must make a handsome profit. Mr. Courtney said that it did not; it had been accused by private contractors of price cutting.

Electronics Course at Harwell

Applications are invited by the Atomic Energy Research Establishment, Harwell, from physicists and electronic engineers holding a degree or equivalent qualification, who wish to attend the ninth electronics course. The course covers the design, use and maintenance of electronic instruments used in nuclear physics, radiochemistry, and in work with radioisotopes. The course, to be held at the Isotope School, Harwell, will be from 1st to 5th November, attendance being limited to twelve students. The fee is 12 guineas, and living accommodation can be arranged for five guineas approximately. Application forms can be obtained from the Electronics Division, A.E.R.E., Harwell, Didcot.

Utrecht Autumn Fair

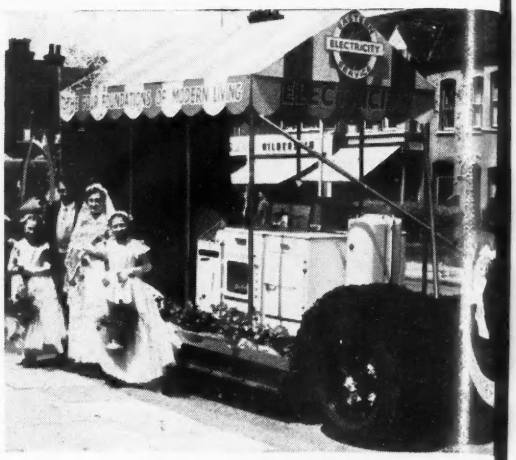
Great Britain will be represented with 251 exhibits at the International Autumn Fair in Utrecht to be held from 7th to 16th September, occupying the second place among the foreign participations.

Railway Electricians' Claim

An industrial court award issued last week finds against a claim that an agreement reached in January, 1953, by the National Joint Industrial Council for the Electricity Supply Industry for the re-assessment of the rates of pay of certain grades, with effect from 1st August, 1952, should be applied to corresponding railway electrical staff.

The court held that while that agreement might constitute one of the relevant factors in the examination of a claim for the re-assessment of pay rates for certain grades of railway electrical staff, it could not be regarded as the sole determining factor.

The parties to the claim were the union and management sides of the National Railway Electrical Council, the number of staff covered by the claim was 673 and its annual cost was estimated at £8,800. The management contended that they could not accept the principle that increases in the electricity supply industry should necessarily result in increases for railway electrical staff nor that the circumstances which gave rise to the re-assessment necessarily existed for the railway staff. The union side claimed that pay and conditions should be similar to those in the supply industry.



This decorated vehicle entered by the local staff of the Eastern Electricity Board in a recent carnival at Dunstable, Beds, was awarded first prize. It portrays the character from one of E.D.A.'s advertisements on the "Four Foundations of Modern Living"

Staveley Company's Acquisition

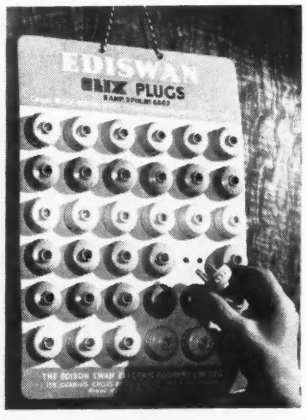
The board of the Staveley Coal & Iron Co., Ltd., announces that arrangements have now been completed for the acquisition of the whole of the issued share capital of W. H. Smith & Co. (Electrical Engineers), Ltd., Manchester, one of the largest electrical contracting companies in the country and manufacturers of radar equipment and electronic control gear for the industrial field. The company will continue under the direction and management of the previous owners, Messrs. W. H. Smith, F. Ainscow and E. J. Byrne.

Fatality

At Halifax recently a verdict of death by misadventure was recorded on Alan Stead, aged two, of Moor Bottom Road, Illingworth, who died on 24th July when he touched a wire fence in the garden of his home.

Mr. A. E. Ellson, a district commercial engineer of the Yorkshire Electricity Board, said that the boy's father, Walter Stead, had connected his radio aerial to the fence, but at the other end the bare aerial was in contact with a live terminal in the set. He thought that the transfer of the set to another cabinet had produced a potentially dangerous situation and it would have been safer if the set had been earthed.

Mr. W. Stead said he bought the set second-hand about a year ago, but did not use it until a few days before the incident. He changed the cabinet because he thought it would look better. The coroner, Mr. B. W. Little, said that the case had demonstrated the necessity of seeking expert advice before embarking on alterations to radio sets.



Ediswan Clix 5 A 2-pin "M" plugs are now available in pastel shades of cream, primrose, green, blue and pink as well as in black, brown and white. Display cards (as illustrated) holding six plugs in each of these colours, and six white plugs, are provided free of charge and form a useful point of sale display

Trade Announcements

The Birmingham Service Depot of **Thorn Electrical Industries, Ltd.,** has moved to 24, Sheepcote Street, Birmingham, 15 (telephone: Birmingham, Midland 5291). The depot has a comprehensive spares and technical advisory service for the company's Ferguson Division and "Mary Ann" household appliances.

A. J. Coleman & Co., Ltd., have removed their trade counter to 33a and 35, Newland, Northampton, a three-storey building. The showrooms are being extended. Newland adjoins The Arcade, so that the departments will be only a few yards apart.

The Nottingham address of the **Simplex Electric Co., Ltd.,** is now St. John's Chambers, 8, Bridlesmith Gate. The telephone number is unchanged.

Kupfer Distributors, Ltd., have been appointed sole distributors by **Ashmor Electrical, Ltd.,** of its fluorescent glow type starter switches.

Uppington & Son, manufacturers' agents, have moved to Swan House, 112, Hotwell Road, Bristol 8 (telephone: Bristol 25410).

Catalogues and Lists

Refrigerator Components, Ltd., 1–2, Greycoat Place, London, S.W.1.—Loose-leaf priced catalogue covering a range of refrigerator components and spares.

G. & J. Weir, Ltd., Cathcart, Glasgow, S.4.—"Feeding the Modern Boiler"—a brief survey of some of the more important factors concerning feed pumps in the feed system of modern power stations (35/2).

Sturdy Electric Co., Ltd., Burnopfield, Newcastle-upon-Tyne. — Catalogue containing general information and technical data on Sturdy transductors.

The Telegraph Construction & Maintenance Co., Ltd., Telcon Works, Greenwich.—Illustrated booklet dealing with the application of plastics in the cable industry (PCI/1).

Installation Queries

Interpretation of I.E.E. Wiring Regulations

THE following notes are based on a selection of replies by the Wiring Regulations Committee of the Institution of Electrical Engineers to requests for interpretations of certain requirements. The word " may " means here that an arrangement complies with the regulations.

One inquirer was informed that the protective covers for live terminals (Reg. 2 (B)) may be fixed by thumb nuts, provided they cannot be inadvertently removed, although special consideration should be given to possible interference by children.

The use of fittings wire and 14/·0076in p.v.c.-insulated flexible cord for extra-low-voltage circuits (Reg. 1306 (B)) would be permissible for various applications referred to in the Telecommunication Codes of Practice (CP307·101 and 327·404).

A fuse protecting a motor circuit may have a higher current rating than the full-load rating of the motor, provided protection is adequate for motor and cables when the motor has run up to speed (Reg. 704 (C)). The rating of the cables between starter and sub-circuit fuse must, however, be so related to the fuse rating as to prevent damage to the cable.

Discharge Lamp Installations

When discharge lamp equipment operates at a r.m.s. voltage not exceeding 300 under steady running conditions and 650 measured on open circuit (Regs. 817 and 803) it escapes the requirements of Regs. 901 and 913 which relate to high voltages. It needs, however, to be inaccessible to unauthorized persons or so designed and installed that no live metal can be touched when a lamp is inserted or removed (Reg. 115). This last regulation applies only to the interior of a discharge lamp fitting. Installations in a factory, however, have to comply with the appropriate regulations under the Factories Act (Form 928).

Where ten lighting points are divided between upstairs and downstairs sub-circuits, each having a separate fuse in the phase conductor, it is not permissible to use a common neutral conductor looped to all lighting points (Reg. 201 (A)). A separate neutral conductor as well as a phase conductor must be brought into the neutral fuse-board.

Rating of Final Sub-Circuit Fuses

More than one cable may be looped into the fuses of final sub-circuits (assuming the fuse terminals to be of adequate size) where the supply of more than one point is permissible. The current rating of the fuse protecting a sub-circuit must not exceed that of the smallest cable connected to it (Reg. 202)—a proviso that is applicable to the otherwise justifiable connection of an electric clock (preferably from a fused clock-connector with adequate terminals) which is looped into a 5 or 15 A final sub-circuit (Reg. 201 (B)). On ring circuits a plug containing a 3 A fuse (to B.S. 1362) may be connected to a B.S. 1363 socket outlet; alternatively a 7/·029 spur feeding a fused clock connector may be used.

Reg. 201 imposes no limit to the number of points supplied by a 15 A final sub-circuit, but providing for diversity (where applicable) the rating of the conductors must be at least two-thirds of the aggregate rating of all the points, and not less than that of the largest point. Exemption (1) of Reg. 201 (C) provides alternatively for the use of 13 A socket outlets.

Fixed appliances under Reg. 201 (D) are only those which cannot be removed without tools. Dual socket-outlets (13 and 5 A) on ring circuits do not meet the requirements of Reg. 201 (C), exemption 4; neither does the interlocking of two spurs, each carrying one or two socket-outlets. No minimum distance is prescribed in the regulations for the separation of a socket-outlet and a gas tap adjacent to the fire-place, but they should not be touchable simultaneously. External wall-mounted metal brackets supporting all-insulated fittings have to be earthed, unless served by tough-rubber or p.v.c. sheathed wiring and within the scope of exemption 5 of Reg. 1001 (A).

A short isolated length of conduit used for mechanized protection is exempt from the requirements of earthing (Reg. 1001 (A)), even if the circuit is terminated in a metal box, which, however, must be so shielded by an insulating switch-plate that it cannot be touched.

Heaters in Bathrooms

While a socket-outlet may be installed in a bathroom out of normal reach for supplying a fixed electric heater complying with B.S. 1670, the use of an electric fire that can be detached without tools and placed elsewhere in the bathroom as a portable appliance is prohibited (Reg. 1002 (E)).

Full-current tests of impedance of earth continuity on a.c. systems (Reg. 1006) are desirably made at supply frequency with 1·5 times the current rating of the final sub-circuit. One end of the earth-continuity conductor should be connected to a cable of known resistance, and an a.c. voltage not exceeding 40 V applied between the other ends of the two joined conductors. The voltage-current ratio, less the resistance of the return conductor, should not then be more than 1·0 ohm. When full-current tests are impracticable, a low a.c. testing current, e.g. 5 A, can be applied; the ratio should not exceed 0·5 ohm where steel conduit forms part of the earth continuity conductor or 1·0 ohm where that conductor is wholly of copper or copper alloy. Where a.c. is not available, d.c. can be used if no inductor (choke) is included in the earth-continuity, and the corresponding maximum resistance values should be the same as for the low current a.c. test.

If any test indicates the possibility of unsatisfactory operation of overload protection, earth leakage protection is required. As an alternative, each final sub-circuit can be tested, after connection to the supply, by an earth-loop impedance tester of the current-injection type. (See " Domestic Electrical Applications—Some Safety Aspects " H. W. Swann, *Proc.* I.E.E., Pt. 2, June, 1952). The test current for this purpose is preferably 1·5 times the circuit rating.

One questioner asked why the connection of a two-wire installation to the supply mains must be by a two-pole linked switch, whereas the neutral of a three- or four-wire switch need be only a link. The answer is that in the first instance the connections at the meter or elsewhere might be reversed, which could hardly occur in the other case.

PIG IRON PRODUCTION

Unusually Large Blast Furnaces

WITH the dual object of increasing the production of pig iron by 600,000 tons a year and coping with a progressive deterioration of local ore having an iron content of only 23 per cent, the Appleby-Frodingham Steel Co. has put down two new blast furnaces at its South Ironworks which are fed entirely by sintered lumps of metal. In this way the furnaces, freed from the duty of extracting non-ferrous elements of the ore (the slag volume amounting to 26 cwt/ton of pig), is used solely for making pig. The total cost, including ore preparation plant (which uses coke breeze and removes the volatile content of the raw material and about 70 per cent of the sulphur), coke ovens and ancillary plant, amounts to over £14 million, bringing the total spent since the war on developments at this plant to £26 million.

The second of the new furnaces (" Queen Victoria ") was blown in on 29th July by Sir Archibald Forbes, chairman of the Iron and Steel Board. The first (" Queen Anne ") was placed in commission last March and is now producing over 7,300 tons a week. Together with two others with hearth diameters of 22ft, installed in 1939 (and after the removal of eight old furnaces), the yearly output of pig iron is expected to reach 1,400,000 tons, which will be supplied to the United Steel Companies, Ltd.

With hearth diameters of 28ft 6in and 27ft and effective volumes of 44,351 and 42,372 cu ft, the new furnaces are the largest in Europe and are believed to be the first in the world to work on a 100 per cent sinter burden.

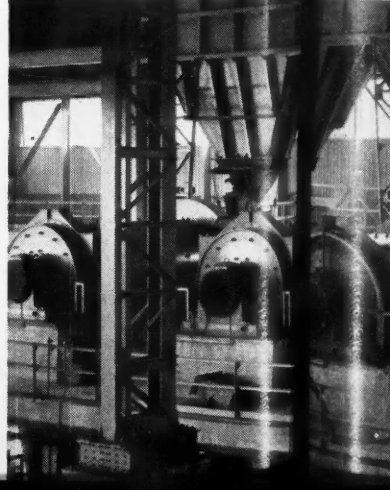
The ore crushing plant with a normal rating of 700 tons per hour is in three stages, the final one of which pulverizes the material to ⅛in, the maximum size requisite for the sintering plant. Four McKee–Head Wrightson sinter machines have been installed. The sinter is air-cooled by 750 r.p.m. Howden fans, each of 300,000 cu ft/min capacity, which are driven by English Electric 2,200 h.p. 6·6 kV synchronous induction motors.

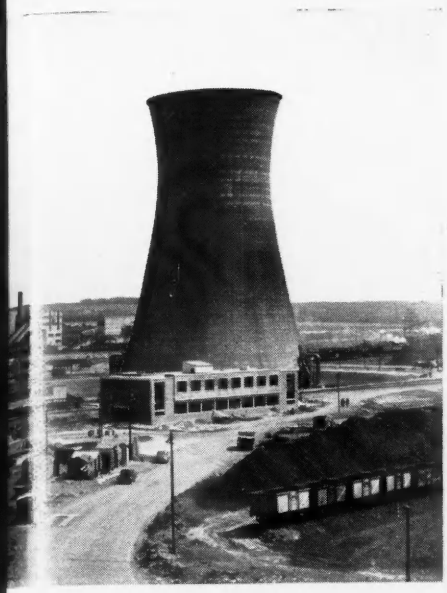
Four 9,000 h.p. 2,740 r.p.m. Parsons turbo-blowers each deliver into a common header 75,000 cu ft/min of air at 30 lb/sq in. Stop-valve steam conditions are 425 lb/sq in and 740 deg F. They are associated with four 85 k lb/hr John Thompson Etaflow boilers fired with blast furnace gas or oil.

Feed water is supplied from three Aiton triple-effect evaporators in association with G. & J. Weir electrically driven feed pumps and steam driven stand-bys. Ring main steam and feed systems have been adopted, Stewarts & Lloyds being responsible for the piping and Hopkinsons for the valves. Circulating water for the turbine condensers, blast furnaces and gas cleaning plant is cooled in three separate sections of a Davenport tower of 2·2 million gal/hr capacity, 265ft high by 183ft diameter at the base. The pump house contains sixteen Mather & Platt circulating pumps and one high-pressure fire pump.

Power for the two new furnaces is obtained from a five-panel 440 V switchboard fed from two 1,000 kVA 6,600/440 V ON transformers, one connected to the Yorkshire Electricity Board's system and the other to the company's own power station.

Each skip hoist for charging the furnaces is driven by two 200 h.p. 500–762–960 r.p.m. motors operated with Ward-Leonard control and fed from a Metropolitan-Vickers 450 h.p./310 kW motor generator via an Igranic charging control panel. Each ore distributor is driven by a 25 h.p. s.c. motor equipped with



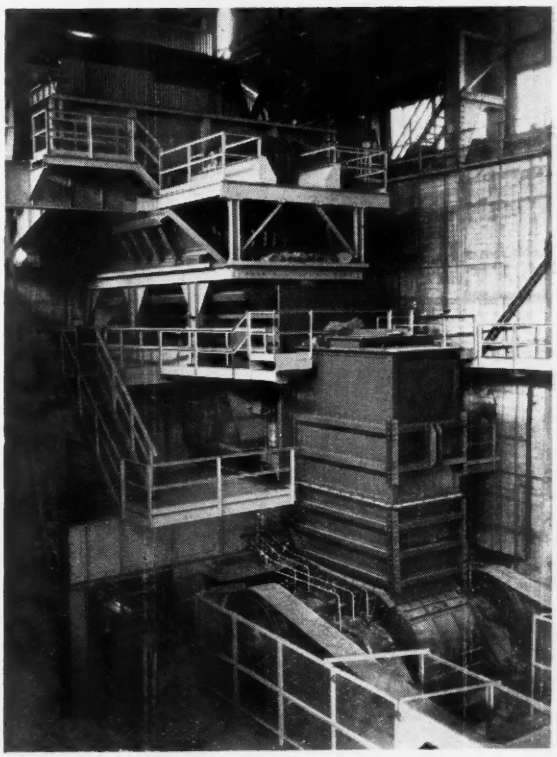


c. injection braking. The connected h.p. for both furnaces is 1,400. Clifford & Snell " Ordasign " and Loudaphone systems and Siemens Pax automatic telephones are installed.

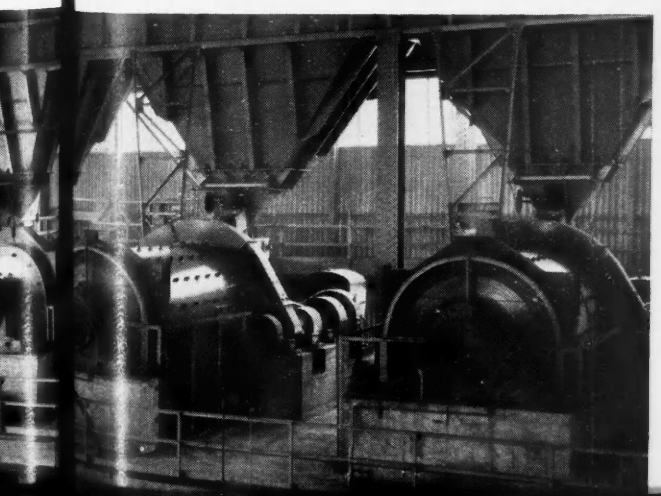
Electricity supplies for the blower house are transformed to 440 V from 6,600 V by four 1,875 kVA transformers, two fed from the Electricity Board and two from the ironworks' own network, and taken to two seven-panel oil circuit breaker switchboards, one controlling the boiler auxiliaries and the other the blower auxiliaries. For each blower there is a five-panel board so arranged that the two c.w. and extraction pumps can be connected to the different sources of supply. The installed motor capacity is 1,126 h.p. For each boiler there is a six-panel board to control 1,865 h.p. of motors, the smaller ones being fed via individual starters of the same make from a Reyrolle fuse switchboard.

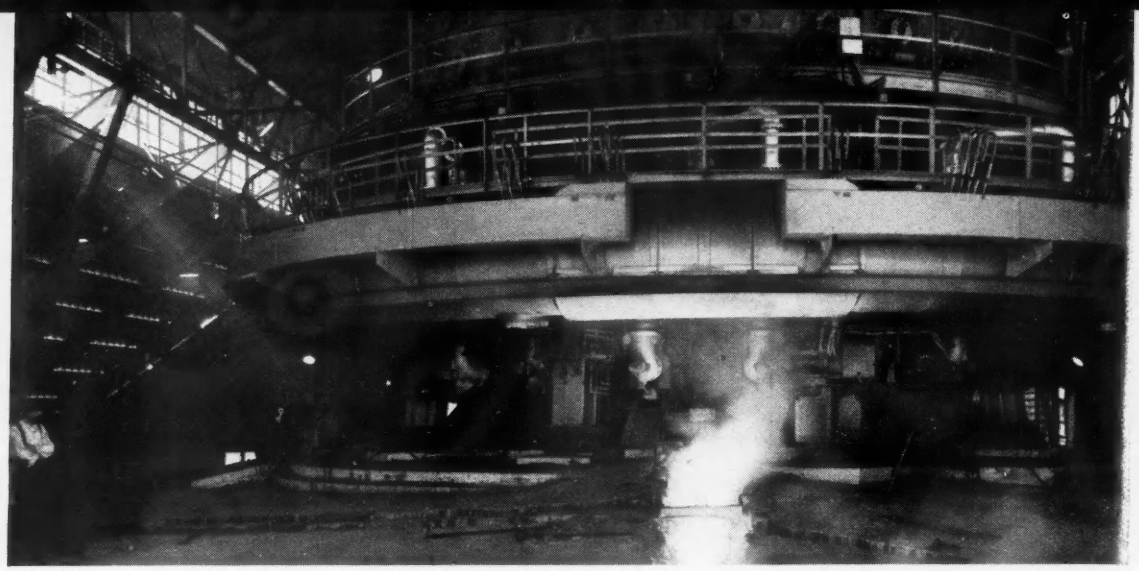
Two 6,600 V feeders from the two independent supply sources are brought into the main circulating water pump house and connected by Metro-Vick isolators to two 1,875 kVA transformers, which feed a seven-panel 440 V oil-breaker single busbar switchboard with section switch. Alternative supplies are given to 3,345 h.p. of motors for blast furnace and gas plant pumps and to 80 h.p. of motors for the Dorr Oliver Clari-flocculators for sludge disposal.

Lighting about the furnaces is generally by Benjamin R.L.M. and angle parabolic fittings. In the cast house,



Top right: Screening section of crusher building. Bottom right: Ore crushing plant. Two-roll primary crusher at floor level, with railway wagon tippler and feeding mechanism above it. Below: Coke grinding plant showing rod mills





Casting at the "Queen Anne" furnace

750 W Holophane fittings are arranged to give 6 L/sq ft at each furnace. Fluorescent tubular lighting is installed in the contactor and instrument rooms. In the boiler, turbo-blower and pump houses Holophane fittings have been supplemented by Walsall bulkhead fittings to provide an average of 8 L/sq ft. The electrical installation here was carried out by W. H. Smith & Co.

For the ore preparation plant 220 V d.c. is provided by a General Electric Co. 250 kW steel-tank pumpless mercury-arc rectifier. At the blast furnaces variable speed and traction drives are catered for by two existing 220 V 750 kW synchronous motor generators.

Lighting circuits are separate from power circuits and the voltage is reduced to 110 V by 25 and 10 kVA double-wound transformers with the secondary midpoints earthed.

Three 440 V substations have been built in the ore preparation area for supplying the ore crushing plant, the sinter plant and the fines system. Motor starters incorporate thermal overload protection (Electrical Apparatus Co.) with provision against single-phasing for motors up to 50 h.p. and P. & B. Gold's relays above this rating. The starters are equipped for remote operation.

The car haulage and tippler, English Electric Co. units, embody Ward-Leonard control for which two 150 kW 220 V generators are driven by a 450 h.p. slipring motor. Two 70 h.p. d.c. mill type motors in series operate the car haulage and one of 110 h.p. operates the tippler.

Each roll of the Hadfield primary and two secondary crushers is driven by a 200 h.p. 750 r.p.m. slipring motor. Tertiary crushing for the fines system is done by hammer mills direct-coupled to 250 and 150 h.p. motors, started by time-limit contactors, which are also employed with the 250 h.p. motors driving the four coke crushers (rod mills).

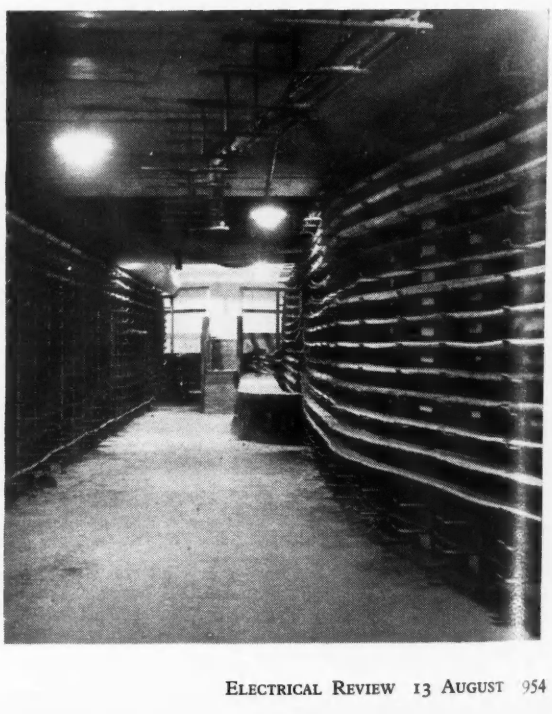
Travelling shuttle conveyors driven by 5 h.p. motors transfer the raw materials to rotary feeder tables, equipped by the British Thomson-Houston Co. with 6–18 h.p. 300–900 r.p.m. compound-wound d.c. motors (corresponding to 2 to 6 r.p.m. of the table) supplied at 110–330 V from two 127 kW motor generators. The shunt fields of the driving motors are separately excited at 220 V. On the operating floor of each sinter plant is a pressurized control room, the desk of which was manufactured in the company's own central electrical maintenance shop.

Six coke feeders transferring coke from the hoppers to the main gathering conveyor are driven by B.T.H. 3 h.p. 500/1,500 r.p.m. 220 V compound-wound motors with shunt control and fitted with tacho-generators to give speed indication. The surge hopper feeder tables are similar to the rotary feeder tables but have 12 h.p. 600–1,200 r.p.m. B.T.H. motors.

The sinter machines are driven by 15 h.p. 325–1,200 r.p.m. 220 V d.c. compound-wound motors with shunt-field regulators and fitted with tacho speed indicators. Electrical installation work in the ore preparation area was carried out by F. H. Wheeler (Sheffield), Ltd. The h.p. of 440 V a.c. motors is 9,700, of d.c. motors 750 and suction fan motors 8,800, making a total of 19,250 for the ore preparation plant.

Electricity supplies for the entire works, except the ore preparation area, are derived from two sources, which are never paralleled, i.e. the company's existing generating plant and the Yorkshire Electricity Board. Duplicate busbar switchgear is generally used at 6,600 and 440 V, and kept energized from both sources. For services vital to plant safety selective duplication is taken as far as motor control gear. The ore preparation area is entirely dependent upon purchased supply on a ring main system with duplicate busbars and feeders.

View of the underground cable tunnel which runs between the sinter plant substation and the crusher substation



Works 33 kV transmission is by cable (3,637 yd route length) provided by Standard Telephones and controlled on the 6,600 V side of the transformers by metalclad oil-break switchgear with duplicate busbars (one being a hospital bus). At the blowing house substation switchgear is by Metropolitan-Vickers and at the ore preparation substation by Reyrolle. In the ore preparation area 6,600 V distribution is from a British Thomson-Houston 13-panel switchboard fed from a 33/6·6 kV 12,500 kVA transformer of the Yorkshire Electric Transformer Co.'s make. At the blast furnaces existing similar B.T.H. transformers and switchgear are used. The 6,600/440 V transformers, rated at 1,875 and 1,000 kVA, are by Parsons. Short circuit energy levels at 6,600 V are 250 MVA and at 440 V they are 25 MVA. Except for the main circulating water and the turbo-blower house, where Reyrolle gear is used, the 440 V switchgear is of the Yorkshire Switchgear Co.'s manufacture. Numerous motor control panels have been supplied by the M. & C. Switchgear Co.

Generally motors throughout the works are 440 V squirrel-cage high-torque machines, with direct-on starters up to 270 h.p. Where, as in ore preparation, s.c. motors are used for heavily loaded or inclined conveyors they have hydraulic couplings with electromagnetic hold-back brakes.

Electrical installation work was engineered as part of their main contracts by Ashmore, Benson, Pease & Co. (blast furnaces), Head, Wrightson & Co. (sinter, gas cleaning and tertiary crushing plants) and Parolle Electrical Plant Co. (blowing and main pumping equipment). Power supplies generally and all the electrical work for the ore preparation area were engineered by the company's electrical department. Other main contractors were Fraser & Chalmers (conveyors, hammer mills, screens and tippler), Ross Engineers (mechanical services and erection at primary and secondary ore crushing plant) and the United Steel Structural Co. (stove casings, chimneys and structural steel work).

European Atomic Energy Society

REPRESENTATIVES from eight European Atomic Energy Commissions have agreed to establish a European Atomic Energy Society (Société Européenne d'Energie Atomique). The eight nations represented are: Belgium, France, Italy, the Netherlands, Norway, Sweden, Switzerland and the United Kingdom. The idea of forming such a Society was presented at the Heavy Water Reactor Conference in Oslo in August, 1953, by Mr. G. Randers, Director of the Dutch-Norwegian Joint Establishment for Nuclear Energy Research.

The chief aim of the new Society is to promote co-operation in nuclear energy research and engineering. To achieve this the Society will: Promote the arranging at regular intervals of international meetings for scientists and engineers working in the field of peaceful application of nuclear energy; promote the circulation of reports and other information of unclassified nature; work for standardization of nomenclature and symbols in nuclear energy; promote the study of hazard and safety measures arising from the application of nuclear energy; promote publication of nuclear energy works, and possibly encourage the establishment of an international journal in the field; and establish a centre of information on availability of nuclear energy materials and equipment.

To enable it to start work on the practical tasks of the Society as soon as possible, the organization has been designed in a simple and flexible way. For the same reason, participation is limited to those nations which have already established nuclear energy projects. The statutes provide, however, that by unanimous decision of the existing members invitations to join the Society may be issued to other European Atomic Energy Commissions which, in the opinion of the Society, have established such projects. The Society was formally established at a meeting at the Royal Society in London on 15th June at which Sir John Cockcroft, Director of the Atomic Energy Research Establishment of Britain, was elected president of the Society for the first year. Mr. Gunnar Randers (Norway) was elected executive vice-president and Dr. Bertrand Goldschmidt (France), vice-president. The executive vice-president will be responsible for the secretariat of the organization.

The Society will be governed by a Council consisting of one delegate from each of the eight member organizations. A Working Group under the leadership of the executive vice-president will take care of the activities of the Society between Council meetings. One of the tasks of the Working Group of the Society is to prepare international conferences on the application of atomic energy. It is hoped that the first conference can be arranged next summer. The difference between the recently formed European Atomic Energy Society and the European Nuclear Research Centre in Geneva is that while the Geneva establishment will carry out only pure scientific research, the European Atomic Energy Society is intended as a European forum for promoting the development of industrial uses of atomic energy.

Heavy Water Nuclear Reactor

THE United Kingdom Atomic Energy Authority has announced that Great Britain's first heavy water nuclear reactor (Dimple) is now in operation at the Atomic Energy Research Establishment, Harwell.

This equipment is a low-powered thermal neutron research reactor, with the heavy water moderator contained in a tank which is surrounded by a graphite neutron reflector, outside of which is a concrete radiation shield. The reactor fuel is submerged in the heavy water. Both the type of fuel and its arrangement in the tank can be changed quickly so that what is, in effect, a different design of reactor can be built up in a few days. The reactor will only be operated at very low power, so that its structure will not become sufficiently radioactive to prevent the necessary handling. The behaviour of the wide variety of design can, therefore, be investigated experimentally in a relatively short time.

The versatility of the reactor will make it an extremely valuable tool in the design of future power producing reactors and for measuring essential constants in reactor physics.

Commemorative Works Journal

THE summer number of the *Heaton Works Journal* of C. A. Parsons & Co., Ltd., is a special issue which is described in gold embossed lettering on the red cover as " commemorating the centenary of the birth of the Hon. Sir Charles A. Parsons, O.M., K.C.B., F.R.S." In addition to the usual wealth of industrial and engineering articles this issue contains an opening biographical article on Sir Charles Parsons, by T. Robinson; " A Tribute to the Memory of Sir Charles Parsons," by Sir Claude Gibb; a report of the Sir Charles Parsons Centenary Exhibition—14th to 26th June, 1954; and " The Place of Sir Charles Parsons in the History of Mechanical Engineering," by Professor A. Burstall.

PORTUGUESE HYDRO-ELECTRIC

British Plant for Second Large Power Station on the River Zezere

THE Cabril power station, on the River Zezere, which was officially opened on 29th July by the President of the Portuguese Republic, His Excellency General F. H. C. Lopes, is the second of the large power schemes promoted by the Hidro-Electrica do Zezere, the first station, Castelo do Bode, having been commissioned in January, 1951. As previously reported in the *Electrical Review*, the generating plant and switchgear have been supplied by the English Electric Export and Trading Co., Ltd., and Metropolitan-Vickers Electrical Export Co., Ltd., acting together and known in Portugal as the "British Group." Since the first of the three 57,400 kVA sets at Castelo do Bode went into service, the British plant has generated 900 million kWh.

The British Group was instructed in April, 1951, to proceed with the plant for the Cabril power station, comprising two 74,800 h.p. water turbines, generators, transformers and switchgear. The first set was required for service in May last, and on the 21st of that month it went into commercial service.

General Scheme

The Cabril dam and power station are situated about 44 miles upstream of Castelo do Bode, so that water passing through the Cabril turbines can be stored in the Castelo do Bode reservoir and used again. With the additional dam and reservoir at Cabril the water level and storage in both reservoirs can be conveniently regulated. The consequent efficient use of the water is important on the Zezere, where sudden floods follow long dry periods.

The dam, of the cupola arch type with a double curvature, is 433ft high. The reservoir extends some 33 miles and has a capacity of 567,000 acre-feet. The spillway comprises two tunnels capable of dealing with a discharge of 140,000 cu ft/sec.

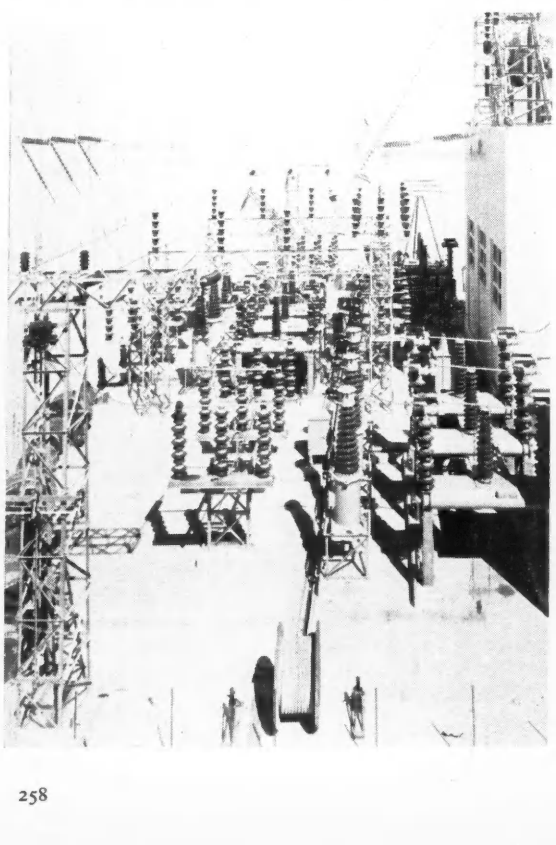
The power station is at the foot of the dam and the water is conveyed to the two turbines by steel penstocks, each 13ft in diameter embedded in the base of the dam. Between the two penstocks is a further scour pipe 10ft 6in in diameter, leading to a disperser valve.

The step-up transformers and 165 kV switchgear are situated between the upstream wall of the power house and the dam and are connected by an overhead line to the Zezere substation (at Castelo do Bode) which is part of the main 165 kV network for Portugal.

Station Arrangement

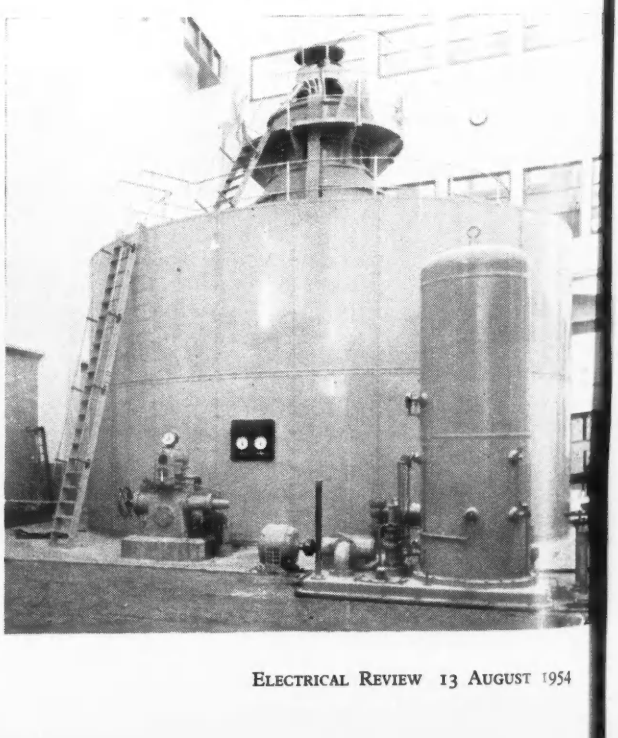
The two inlet valves are within the walls of the turbine house, so that they can be handled by the crane. The machine gauge panel, the valve control panel, the field suppression switch and the essential auxiliaries controls are all on one board, inset into the upstream wall.

The station also contains a 1,125 kVA water turbine-driven auxiliary set, fed from a tapping off the main penstocks, and arranged at the right hand side of the power house. The control room, above the auxiliary set annexe,

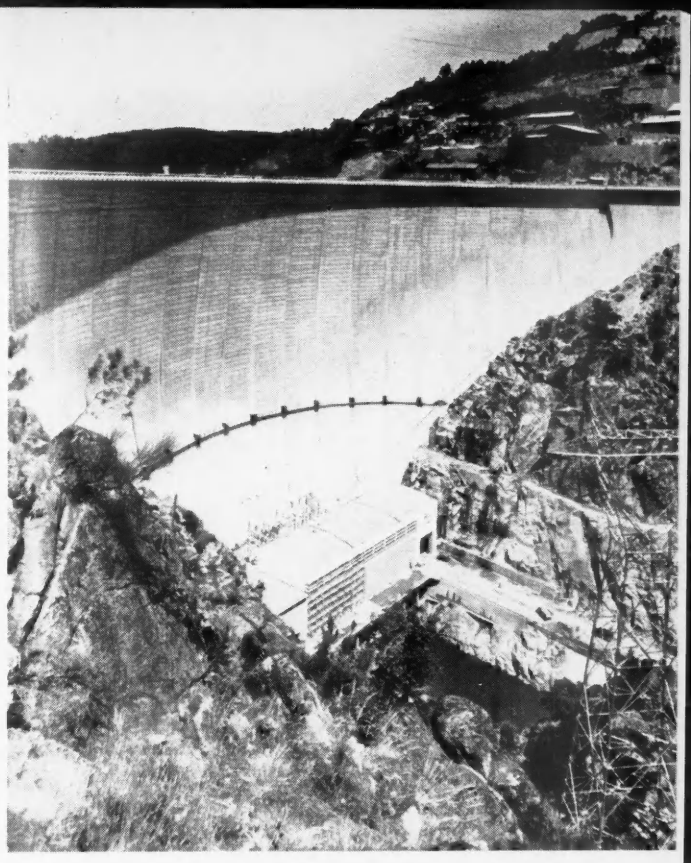


Left : The 165 kV substation between the dam and the power station

Below : One of the 6 MVA generators



DEVELOPMENT



General view of Cabril power station and the dam

overlooks the machine room. The generator terminals are connected to the step-up transformers in the upstream substation by means of 15 kV bare copper busbars.

The two main turbines are of the vertical reaction type and run at 214 r.p.m. They are each designed for an output of 66,000 h.p. at the average head of 355ft, but give 74,800 h.p. at the maximum head of 397ft.

The turbines are generally similar to those at Castelo do Bode but allowance had to be made for an increase of 7 per cent in the head, and model tests were carried out on the runner. The runner, 11ft in diameter, is fabricated by welding the pressed vanes to the crown and rim. The spiral casing is of welded construction, as are the top cover and general turbine parts. The inlet valves of 11ft bore are of the "straight-flow" type and again are similar in design to those at Castelo do Bode, with due allowance for the increased head. The disperser valve, 9ft 10in in diameter, is capable of discharging water at 7,000 cu ft/sec.

The 15·5 kV generators are likewise similar to those at Castelo do Bode but are rated to give a maximum continuous output of 61,000 kVA at 0·892 power factor, corresponding to the maximum turbine output.

The main transformers, 15·5/165 kV three-phase, are rated at 61,000 kVA. Cooling is effected by oil circulation through water-cooled coolers.

The two generators are connected solidly to their associated transformers, switching being at 165 kV. The 165 kV switchgear is of the air-blast type, similar to that at Castelo do Bode, with a rating of 2,500 MVA at 165 kV, the feeder breaker being equipped with high speed reclosure.

The 380 V auxiliary supply is available from three sources, the unit transformer, the auxiliary generator and the station transformer, which is supplied from an external source, and is distributed by 1,600 A and 600 A air-break circuit breakers in conjunction with metal-clad fuse-switch units.

Included on the main control board is an illuminated mimic diagram of the 165 kV, 15 kV and 380 V systems. Automatic synchronizing equipment is provided for starting up and automatic voltage regulators control the machines while on load.

The generator and transformer units are protected separately by biased differential protection. The generators also have over-voltage with back-up overcurrent protection, and the transformers have Buchholz and oil and winding temperature devices, with back-up earth fault protection. Surge protection of the outgoing 165 kV line is provided by 165 kV Metrosil units.

The turbines, straight-flow main inlet valves, disperser valve, generators and transformers have been supplied by the English Electric Co., Ltd., whilst the control gear, low voltage switchgear, cabling and 165 kV air-blast switchgear at the substation have been supplied by the Metropolitan-Vickers Electrical Co., Ltd.

Inquiry into Electricity Supply Industry

THE Committee of Inquiry into the Electricity Supply Industry in England and Wales which was appointed early in July under the chairmanship of Sir Edwin Herbert, LL.B., has invited a number of organizations representative of various consumer interests to submit evidence on any matter within the scope of the inquiry which they may wish to bring to the attention of the Committee. Among the organizations approached are those representing local authorities, the Federation of British Industries, the National Union of Manufacturers, the Association of British Chambers of Commerce, the Co-operative Union, the National Chamber of Trade, the Retail Distributors' Association, the Trades Union Congress, the National Farmers' Union, the Country Landowners' Association and a number of women's organizations. It should, however, be made clear that the Committee will welcome representations from any consumer or group of consumers. In all cases evidence, accompanied by any recommendation for improved service, should be submitted before the end of September.

The representative consumer organizations have been asked, in particular, to give their observations upon the structure of electricity tariffs and methods of charging for electricity; the quality of electricity supply and service, including the supply of various types of equipment, with reference particularly to any changes for better or worse consumers may have observed since 1947; and the effectiveness of Electricity Consultative Councils to represent and safeguard consumer interests. Consultative Councils have also been asked to submit their views. At a later stage the Committee intends to seek the views of the Council for Wales and Monmouthshire.

Evidence should be sent to the Secretary, Committee of Inquiry into the Electricity Supply Industry, Ministry of Fuel and Power, Thames House South, Millbank, London, S.W.1.

Financial Section

STOCKS and SHARES

HOLIDAY influences have so far made remarkably little impression on Stock Exchange markets. In the first part of this month, at any rate, business could still be described definitely as active, with prices at least firm in most departments. Gilt-edged stocks have been showing the way. A further advance there, reflected the widespread impression that the trend of interest rates is still downwards. This, of course, provided fresh support for the industrial market, where, from other points of view, some people were beginning to regard a good many prices as being high enough for the present.

Price Changes

British Electricity stocks were all marked up sharply, with the 4¼ per cents again prominent, in anticipation of an announcement of a new issue by the Authority. In the electrical equipment market the leaders were steady with G.E.C. still very firm as a result of last month's dividend and results. Scottish Cables were in demand, rising to 19s 6d. Several good features occurred in the radio and "electronics" group, where Cossors were again to the fore. English Electrics, officially unchanged at 50s, were quoted up to 51s 9d in the market after reports of the company's new aircraft success, and the declaration of the 4 per cent interim dividend. E. K. Cole were quoted ex-rights to the offer of new 5s shares at 21s, in the proportion of two for every five held. The new shares changed hands initially at a premium of 14s. The old shares are 33s 9d. Ultra Electrics rose sharply to 17s 3d.

"Emmies" Revival

Electric and Musical Industries 10s shares have made big strides recently, more than recovering the depression occasioned by last year's reduction of the dividend from 12 to 8 per cent. Following another advance of 1s 3d over the past week, the present price of 19s compares with a figure of only 11s 6d at the beginning of the year. Annual accounts are made up to the end of June, and the practice is to make a single ordinary distribution about October. Last year's report gave a variable account of the outlook for the several sides of the business. The subsequent rise in the price of the shares seems to reflect the indications of better trade this year in the "consumer" class of electrical goods, to which references were made in the G.E.C. annual report. The further outlook is regarded as having been improved recently by the relaxation of hire-purchase restrictions.

Mather & Platt

The £1 ordinary shares of Mather & Platt, Ltd., are now quoted ex the capitalization issue (as bonus distributions must now officially be described) of two new shares for every three old shares held. They have been one of this year's most successful engineering investments, for the price has come up

Two Weeks' Price Changes

Company or Board	Nom. Value	Middle price 9th Aug.	Two Weeks' Rise or Fall	Dividend Previous	Dividend Last	Yield %	1954 Highest	1954 Lowest
Gilt-edged Stocks						£ s d		
Brit. Elec. 1968/73	100	96½	+1½	3	3	3 2 3	97	88⅞
Brit. Elec. 1974/77	100	95xd	+2	3	3	3 3 2	96½	87½
Brit. Elec. 1976/79	100	101½	+1½	3½	3½	3 9 0	101½	93⅜
Brit. Elec. 1974/79	100	111½	+2	4¼	4¼	3 16 3	111½	103⅛
Overseas Electric Supply								
Calcutta Elec.	£1	21/6	+3d	6†	6†	5 11 6†	21/6	18/7
East African Power	£1	22/-	+1/6	7	7	6 7 3	23/4	19/6
Nigerian Elec.	£1	24/-		10	10	8 6 8	25/-	23/6
Palestine Elec. "A"	£1	20/6		Nil	Nil	Nil	20/6	16/-
Perak Hydro-Elec.	£1	15/-		Nil	6	8 0 0	15/6	13/9
Equipment and Manufacturing								
Aberdare Cables	5/-	12/-	+1/6	25	12½*	5 4 3	12/-	8/1
Aerialite	1/-	12/6		88⅓	88⅓	7 1 6	12/6	10/9
Allen, W. H.	£1	74/6	+1/3	15	20	5 7 6	74/6	50/-
Aron Elec. Ord.	£1	45/-		20	15	6 13 4	50/-	43/-
Assoc. Elec. Ord.	£1	60/-		20	11½*	3 15 0	60/-	41/6
Automatic Tel. & El.	£1	68/9	−1/3	15	15	—	71/3	57/3
Babcock & Wilcox	£1	62/3	+9d	18	12*	3 17 2	62/3	47/3
Baldwin, H. J.	2/-	4/6		20	20	8 18 0	5/6	3/9
Bakelite	10/-	26/3		12½	12½	4 15 3	27/6	23/6
British Aluminium	£1	35/9	−1/3	12	10	5 12 0	40/-	34/6
B.I. Callender's	£1	46/3		10	10	4 6 6	46/3	37/9
B.I. Callender's 6% Pref.	£1	26/-		6	6	4 12 3	26/-	24/3
British Thermostat	5/-	23/9		35	27½*	—	23/9	12/-
British Vac. Cleaner	5/-	14/6	+6d	25	25	8 12 6	14/6	11/6
Brook Motors	10/-	42/6		20	20*	4 14 3	42/6	33/3
Brush Ord.	5/-	7/-	+3d	4	6	4 5 9	7/-	3/6
Bulgin, A. F.	1/-	3/3		30	30	9 4 6	3/7	3/2
Burco	5/-	16/6	+9d	35	35	5 6 0*	16/6	12/1
Chloride El. Storage	£1	67/6	−6d	20	12½*	3 14 0	68/-	46/6
Clarke Chapman	£1	67/6	+8/9	17½	20	—	67/6	47/6
Cole, E. K.	5/-	33/9xc		25	27½	—	38/9	22/6
Cossor, A. C.	5/-	10/3	+9d	10	10	4 17 6	10/3	7/-
Crabtree	10/-	28/9		17½	17½	6 1 9	29/6	23/9
Crompton Parkinson Ord.	5/-	18/3		11¼	20	5 9 7	18/3	14/-
De La Rue	5/-	18/6	+1/6	Nil	20	5 8 1	18/6	12/3
Decca	4/-	41/6		150	35*	—	41/6	32/-
Desoutter	5/-	19/3		18	20	5 4 0	19/3	16/1
Dewhurst	2/-	6/-		19	19	6 6 9	6/3	5/1
Dictograph Tel.	2/-	6/6	+6d	20	20*	6 3 0	6/6	5/2
Dubilier Condenser	1/-	5/6	−3d	25	25	4 11 0	6/-	4/1
E.M.I.	10/-	19/-	+1/3	12	8	4 4 3	19/-	11/3
Electrical Components	5/-	13/3		20	20	7 11 0	13/3	10/9
Elec. Construction	£1	60/9		15	15	4 18 8	61/3	53/-
Enfield Cable Ord.	£1	21/3	−2/6	5	Nil	Nil	25/-	16/6
English Electric	£1	52/-	+2/-	15	10*	3 17 0	52/6	38/-
English Electric 3½% Pref.	£1	16/6		3¾	3¾	4 11 0	16/6	15/3
Ericsson Tel.	5/-	26/3		22†	25†	2 7 6*†	26/6	22/9
Ever Ready	5/-	25/6	+6d	35	40	—	25/6	17/9
Falk Stadelmann	£1	39/6	+1/-	15	15	7 12 0	41/-	36/6
G.E.C. Ord.	£1	50/-		11½	12½	5 0 0	51/-	37/6
G.E.C. 6½% Pref.	£1	27/-		6½	6½	4 16 3	27/3	26/6
General Cables	5/-	16/9		30	30	8 19 0	16/10	16/3
Greenwood & Batley	£1	50/-		17½	17½	7 0 0	50/-	40/3
Hackbridge Cable	5/-	15/-	−3d	20	20	6 13 4	15/3	11/3
Hackbridge & Hewittic	5/-	22/6	−9d	20	25	5 11 0	23/3	16/10
Hall Tel. Acc.	10/-	11/6	+6d	10	10	8 14 0	11/11	10/6
Heatrae	2/-	5/-		12½	12½	5 0 0	5/-	4/-
Henley's	10/-	19/6		10½	10½	5 7 9	19/6	15/9
Holophane	5/-	15/3		20	20	6 11 2	15/3	13/1

* After capital bonus. † Free of income tax.

The above quotations are based upon middle prices in the Stock Exchange Daily Official List.

from the equivalent of 32s 3d to a present figure of 45s 6d. Moreover, the rise has not been assisted by any increase in the rate of dividend, which was kept this year at the previous level of 15 per cent (including 5 per cent as bonus) although the earnings of 1953 expanded to the equivalent of more than 60 per cent on the capital then ranking. Reduction of the rate of dividend in proportion to the increase in the number of shares now participating would make it 9 per cent, and the yield on the shares only 4 per cent. In the market it is thought that one important factor in the popularity of the shares is the reference at the last annual meeting to contracts in connection with the generation of electricity by atomic energy.

in Electrical Investments

Company or Board	Nom. Value	Middle price 9th Aug.	Two Weeks' Rise or Fall	Dividend Previous	Dividend Last	Yield %	1954 Highest	1954 Lowest
Equipment and Manufacturing—continued.						£ s d		
Hoover	5/-	45/9	−6d	25	45	5 10 6	41/3	26/3
I.C.I.	£1	36/9	+1/3	13	15	4 1 6*	37/-	26/6
Int. Combustion	5/-	24/-		15	20	4 3 4	24/-	14/6
Johnson & Phillips	£1	48/6	+6d	15	15	6 3 0	52/3	47/6
Lancashire Dynamo	£1	57/6		12½	14	4 17 6	57/6	43/-
Laurence, Scott	5/-	25/-		15	20	4 0 0	25/-	14/-
Lister, R. A.	£1	43/-		9	12	5 11 7	43/6	31/9
London Elec. Wire	£1	46/3		15	10*	4 6 7	47/3	38/-
Lucas, J.	£1	36/3	+2/6	9⅛	10†	2 19 9*	36/3	25/3
Merryat & Scott	2/-	7/-		22½	25	7 2 9	7/-	5/11
Mather & Platt	£1	45/6	−1/6	12½	15	—	47/-	32/-
Metal Industries	£1	34/-	+2/3	12	9	5 6 0	42/3	29/6
Midland Elec. Mfg.	£1	67/6		15	15	4 9 0	67/6	63/-
Murphy-Richards	4/-	20/-		40	40	—	20/-	11/4
Mirrex	£1	51/-	−3/-	15	15	5 17 9	57/-	50/-
Newman Ind.	2/-	2/4½		10	10	8 8 5	2/6	2/-
Oldham & Son	1/-	3/-		17½	17½	5 16 8	3/4	2/5
Parnall (Yate)	5/-	8/-	+1/-	6	8	5 0 0	8/-	4/3
Parsons, C. A.	£1	56/3	+1/3	12½	7½*	2 13 7	56/3	38/1
Plessey	10/-	57/6	+1/6	25	30	—	57/6	37/10
Pye Deferred	5/-	27/6	+1/-	20	20*	3 12 9	27/6	15/7
Revo	10/-	14/-	−1/3	27½	9*	6 8 6	20/3	14/-
Reyrolle	£1	88/9	−1/3	12½	13½	3 2 0	90/-	66/-
Rheostatic	4/-	14/3	+1/9	19	20	5 12 3	14/3	11/-
Richardsons Westgarth	5/-	12/3	+6d	15	15*	6 2 6	12/3	6/6
Scottish Cables	4/-	19/9	+1/3	20	27½	5 11 3	19/9	12/11
Siemens Ord.	£1	39/6	+6d	10	10	5 1 3	43/9	33/9
Smith (England), S.	4/-	12/6	+1/-	12½	15	—	12/6	7/8
Southern Areas	£1	27/-	+9d	6	7½	5 11 0	27/-	17/6
Strand Elec.	5/-	8/9		17½	17½	10 0 0	9/3	8/3
Sturtevant	5/-	40/9	+9d	18·1†	18·9*†	2 5 6†	40/9	29/-
Sun Elec.	£1	32/6		15	15	9 4 8	32/6	27/6
Switchgear & Cowans	5/-	12/9		22½	10	3 18 6	13/7	9/9
Taylor Tunnicliff	5/-	11/-		25	12½*	5 13 9	12/4	10/7
T.C.C.	10/-	33/9	+1/3	20	30*	—	33/9	21/3
T.C. & M.	£1	33/9		10	8½*	5 0 9	34/6	30/3
Telephone Mfg.	5/-	9/-		10	10	5 14 3	9/-	7/6
Thorn Elec.	5/-	22/9	+1/3	12½	20	4 8 0	22/9	13/3
Thornycroft	£1	44/3	−2/-	15	15	6 15 6	47/6	33/4
Tube Investments	£1	68/9	+2/6	15*	15	4 7 3	68/9	60/3
Vactric	5/-	16/9		Nil	10	2 19 9	17/6	7/6
Veritys	5/-	6/9		10	12½	9 5 3	8/3	5/-
Walsall Conduits	4/-	51/3		70	70	5 9 4	52/6	44/-
Ward & Goldstone	5/-	64/6		45	50	3 17 6	64/6	41/3
Watford	2/-	6/9	+4½d	25	22½*	—	6/9	4/7
Westinghouse Brake	£1	71/3		14	15	4 4 3	72/6	60/9
West, Allen	5/-	15/9		15	17½	5 11 0	15/9	12/7
Wolf Electric	5/-	14/9	+1/-	15	17½	5 18 9	14/9	11/-
Trusts, Transport and Communications								
Anglo-Am. Tel.:								
A Ord.	100	83½	+1	—	6	7 3 9	89½	80
Ord.	100	52½		—	3¾	7 2 10	55½	52
Anglo-Portuguese	£1	24/-	+3d	8	8	6 13 4	24/-	21/-
Brit. Elec. Traction:								
Def. Ord.	5/-	59/6	−6d	35	50	4 4 0	60/-	39/1
Cable & Wireless:								
Ord.	£1	38/6	+1/-	8	9	4 13 6	40/6	26/2
4% Loan	100	98½		4	4½	4 1 3	98½	95½
Calcutta Trams	£1	21/-	+2/-	6†	2½†	—	21/-	17/1
Cape Elec. Trams	£1	15/-		5½	5½	7 6 8	15/3	12/4
Marconi Marine	£1	33/9		10	10	5 18 6	33/9	27/6
Oriental Tel. Ord.	£1	92/-	+9d	16	16	—	92/-	82/6
Telephone Props.	£1	5½		8	8	—	5½	4½
Telephone Rentals	5/-	10/6	+3d	10	10*	—	10/6	9/-

" Excess " Shares

Following the " rights " issues of shares by the Pye and Broadcast Relay Service companies, and now another from E. K. Cole, a word may be in season regarding the invitation, nearly always given on these occasions, by which shareholders can apply for " excess " shares in addition to the fixed number provisionally allotted to them. The " excess " arises, of course, from the failure of some shareholders, for one reason or another, to take up their allotments. It goes without saying that if the new shares develop anything large in the way of a premium applicants for the " excess " shares can expect to receive at best a small proportion of their requirements. Many people, however, think it worth while to try for the acquisition of even a small number below the market price, whether or not they intend to keep an allotment.

Thorn Electrical

The 5s shares of Thorn Electrical Industries have retained the rise to 22s 9d induced, at the end of last month, by the increase in the dividend from 12½ to 20 per cent, and by the profits statement showing an expansion by more than a third in the trading profit for 1953–54. The latter crossed the million mark. Despite much larger charges for depreciation and taxation, an improvement of over £90,000 remained in the net surplus of £316,000, so that the higher rate of dividend still leaves more than four-fifths of the profit to go back into the business. This conservatism and the uninterrupted expansion of earnings in recent years are reflected in a yield of under 4½ per cent on the shares. Steps have been taken to finance further progress by the issue of half a million loan stock.

Lucas Industries

The financial year of Joseph Lucas (Industries) ended with last month. The final dividend may be expected to appear, together with the preliminary results, in a few months' time. Meanwhile the £1 shares have, like those of Mather & Platt, lately been quoted ex a capitalization issue. For the ordinary capital, this was a free share-for-share distribution, and the new shares will rank for the final dividend. The yield at their present price works out at barely 3 per cent, based on half of last year's very conservative rate of dividend. That payment was covered some six times over by the year's distributable net earnings, and the interim on account of the twelvemonth just ended was increased.

REPORTS and DIVIDENDS

Oldham & Son, Ltd.—The accounts for the year to 31st March last show a consolidated profit on trading of £299,124, as compared with £300,321 for 1952–53, and after meeting all charges including £154,967 for taxation, the net profit is £115,783 (against £109,247), of which £115,641 is attributable to the parent company. General reserve receives £50,000 and the ordinary dividend for the year is maintained at 17½ per cent by a final payment of 10 per cent. The balance carried forward by the parent company and its subsidiaries is £127,177 (against £106,911 brought in).

In his statement which accompanies the report and accounts, Mr. John Oldham (chairman) says that the demand for automobile replacement batteries has substantially increased. In the mine lighting field the volume of new equipments supplied from the Denton factory has been lower than in previous years, due mainly to the fact that the programmes of lighting re-equipment in the British mining industry have been largely completed. On the other hand, there have been increases in the production of this type of equipment by associated companies overseas.

On the export side there has been an increase of over 50 per cent in the volume of goods shipped overseas, as compared with the previous year, and to-day the company is making direct exports to over 100 countries. The production of the associated companies overseas and these direct exports now represent some 40 per cent of the group's total production. During the year three new subsidiary companies have been added to the overseas group. Two of them—Fibrak (Australia) Pty., Ltd., and the Compagnié Francaise des Separateurs Fibrak—will be engaged in the manufacture and distribution of Fibrak separators. The third—Oldham & Son Central Africa (Pvt.), Ltd.—will establish sales and service in a large area of Central Africa. The remaining members of the group report satisfactory progress.

Mr. Oldham reviews the technical and operating developments during the year in the fields of mining, aircraft, and automobile, and refers to a new range of emergency lighting equipment for hospitals, cinemas and schools.

E. K. Cole, Ltd.—London and Yorkshire Trust announces that underwriting has been completed for an issue of 500,000 ordinary shares of 5s each at the price of 21s per share; 470,520 of these shares will be provisionally allotted to the holders of the existing ordinary stock in the proportion of two new ordinary shares for every five ordinary stock units held. Ordinary stockholders will also be entitled to apply for new ordinary shares not taken up under the provisional allotments or which are not provisionally allotted. Applications for excess shares will be restricted to one quarter of the number of ordinary stock units held.

Falk, Stadelmann & Co., Ltd., have declared an interim dividend of 10 per cent on the ordinary shares (unchanged).

The Calcutta Tramways Co., Ltd., reports that after deducting taxation of £33,500, the revenue balance for the year to 31st December last is £78,703, as compared with £87,457 for 1952. It is proposed to pay a final ordinary dividend of 3½ per cent making 6 per cent, tax free, for the year. In the previous year an interim dividend of 2½ per cent was paid, but in order to conserve remaining cash resources, no final dividend was recommended.

Parmiter, Hope & Sugden, Ltd., announce that the profit for the year ended 31st March, after charging directors' fees, depreciation and staff superannuation, was £76,902, as compared with £77,003 in the previous year. After deducting taxation £45,324 (£39,361), and transferring £5,000 (£15,710) to general reserve, it is proposed to pay a final ordinary dividend of 22½ per cent, making 30 per cent (25½ per cent) and to carry forward £27,300 (£25,135).

Gabriel, Wade & English, Ltd., are to pay a dividend of 17½ per cent including a bonus of 7½ per cent (same).

The English Electric Co., Ltd., is paying an interim ordinary dividend of 4 per cent (against 5 per cent), on doubled capital.

New Companies

Shimwell Alexander Manufacturing, Ltd.—Registered 27th July. Capital £5,000. Manufacturers and dealers in electrical and mechanical apparatus, accessories and components, electric motors, switches and switchgear, cables, conduits, etc. Directors: N. B. Mackay, J. A. Shimwell, Mrs. Enid F. Mackay and Mrs. Freda M. Shimwell. Secretary: Enid F. Mackay. Regd. office: 20, Dock Street, Stepney, E.1.

Batson & Davis, Ltd.—Registered 27th July. Capital £4,000. Electrical contractors, manufacturers and dealers in electrical goods, including dynamos, armatures, etc. Directors: H. Batson and R. V. Davis. Secretary: Elsie M. Davis. Regd. office: 6, Richfords Hill, Aylesbury, Bucks.

Patent Lighting Co., Ltd.—Registered 30th June. Capital £50,000. To acquire the whole or any part of the undertaking, business and goodwill of Coast Lighting, Ltd., and to carry on the business of manufacturers and dealers in lamps or other means of illumination. Subscribers: A. H. Dodd and M. Scott. Solicitors: Freshfields, 1, Bank Buildings, Princes Street, E.C.2.

West & Cooke, Ltd.—Registered 15th July. Capital £5,000. Automobile electricians and dealers in automobile electrical equipment, etc. Directors: C. West, H. Cooke and H. Wales. Regd. office: 61, Nottingham Road, Loughborough, Leics.

H. Kelly & Co., Ltd.—Registered in Belfast 1st June. Capital £2,000. Electrical contractors and engineers, agents for wireless, radio and television sets, etc. Directors: H. Kelly and F. Jeffers. Regd. office: 44, Little May Street, Belfast.

Turner Electrical Co. (Bradford), Ltd.—Registered 15th July. Capital £1,000. Electrical engineers and contractors, etc. Directors: W. Nicholls. C. Nicholls, W. G. Nicholls and F. Turner Regd. office: Jacob Street, Manchester Road, Bradford.

Direct T.V. Windings, Ltd.—Registered 24th June. Capital £1,000. Manufacturers of and dealers in radio, radar, television, electronic and electrical components, windings and coils, etc. Directors: A. Rose, Ethel Rose and L. Hartless. Reg. office: 134–6, Lewisham Way, New Cross, S.E.14.

Dixon-Leslye, Ltd.—Registered 24th June. Capital £1,500. Manufacturers and repairers of and dealers in electronic, medical and electrical equipment and instruments, plant, machinery, fittings, accessories, machine and other tools, etc. Directors: J. G. Dixon and Mrs. Isabel Dixon. Regd. office: 23, St. Mary's Place, Newcastle-on-Tyne, 1.

Advanced Heating & Air Conditioning Co., Ltd.—Registered 26th June. Capital £2,000. Heating, ventilating, sanitary, electrical and general engineers, etc. Directors: F. J. Whyte and Vera S. O. Whyte. Regd. office: Pickmoss, Otford, Kent.

Anglian Cable & Engineering Co., Ltd.—Registered 30th July. Capital £1,000. Electrical, constructional and general engineers, cable layers, etc. Regd. office: 210, Capel House, New Broad Street, E.C.2.

Elekraft, Ltd.—Registered 30th July. Capital £500. Electrical engineers and contractors, etc. Directors: A. H. Slingsby, K. L. Hutchings and T. J. Jenning. Regd. office: 123, The Avenue, Hornchurch, Essex.

Increases of Capital

P. H. Carlow, Ltd.—Increased by £1,400, in £1 ordinary shares, beyond the registered capital of £100.

Walter Collins (Electrical Appliances), Ltd.—Increased by £900, in £1 "B" ordinary shares, beyond the registered capital of £100.

Stonebridge Electrical Co., Ltd.—Increased by £9,000, in £1 ordinary shares, beyond the registered capital of £1,000.

T. H. Wathes & Co., Ltd.—Increased by £11,200, in £1 "B" preference shares, beyond the registered capital of £23,000.

Neo Electrical Industries, Ltd.—Increased by £2,500, in £1 ordinary shares, beyond the registered capital of £500.

Fulsen & Co., Ltd.—Increased by £16,500, in £1 ordinary shares, beyond the registered capital of £3,500.

James Kilpatrick & Son, Ltd.—Increased by £50,000, in £1 ordinary shares, beyond the registered capital of £15,000.

Bankruptcies

M. Tilley, 13, Shakespeare Street, Newcastle-on-Tyne, electrical and radio wholesaler, trading as Hawkins, Tilley & Co.—Trustee, Mr. R. F. Howe, Clarendon House, Clayton Street West, Newcastle-on-Tyne, released 28th July.

R. C. Alexander, carrying on business under the style of Tees Electrical Installation Co. at 12, Mandale Road, Thornaby-on-Tees, and also formerly at 4, Barrington Street, South Shields, electrical contractor.—Trustee, Mr. W. J. E. Ringquist, Finkle Chambers, Stockton-on-Tees, released 22nd May.

T. G. Coaton, 16, Humberstone Road, Leicester, electrical engineer, trading as T. G. Coaton & Co.—Supplemental dividend of 4¾d in the £, payable on and after 14th August at the Official Receiver's office, 27, Regent Street, Park Row, Nottingham.

Rawlplug Fixing Devices and tools

First and foremost, with every Rawlplug Fixing Device, comes *strength*—solid, lasting strength that never fails. Rawlplug methods *are* faster too—very much so. This combination of strength and speed is the reason why millions of Rawlplug Fixing Devices are used by all sections of Industry every year.

AND THE ENGINEERING INDUSTRY

When fixing plant and machinery to floors, use the Loose Bolt type of Rawlbolt—you slide the machine into position *without lifting*! For walls, use the Bolt Projecting type—you can then suspend the fixture on the bolts while nuts are put on and tightened. There are special Rawlplug Devices to meet every problem, including fixing under water and in chemical fumes.

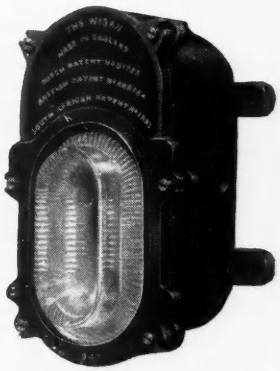
Write our Technical Dept. about your fixing problem

8479

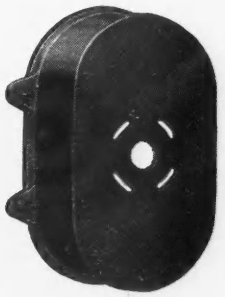
THE WORLD-WIDE FIXING DEVICES ORGANISATION THE RAWLPLUG COMPANY LTD · CROMWELL ROAD · LONDON · SW7

ILLUMINATION EFFICIENCY

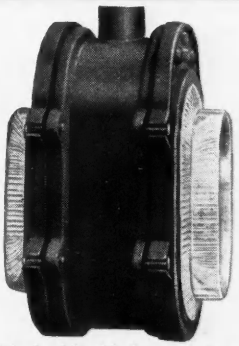
plus ROBUST construction



Our prismatic fittings are made for all sizes of Tungsten Filament Lamps up to 150 watts. Illustrated above is the standard model.



They are also made for B.S.1. box attachment.



This double-sided type is for use in single brick walls, etc.

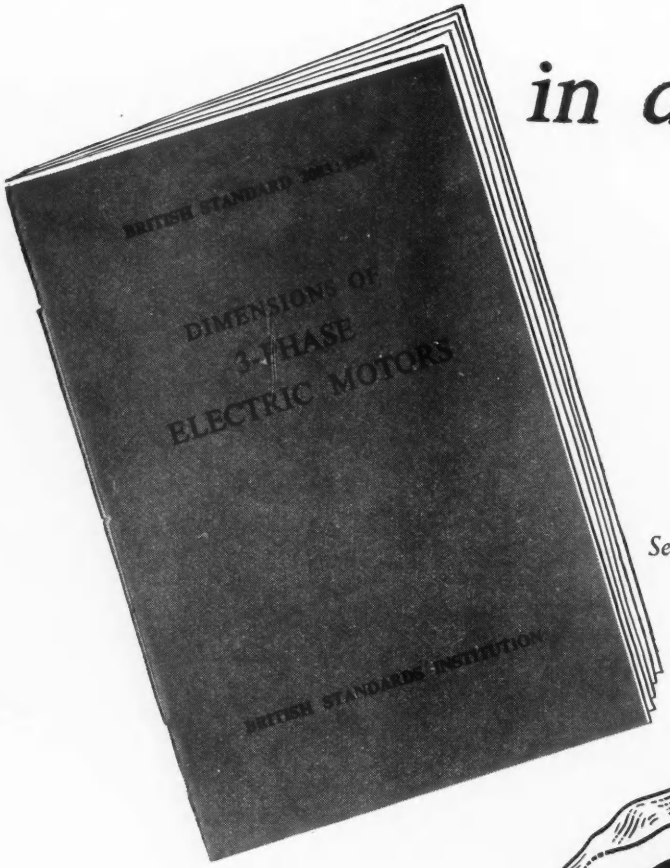
HEYES *of Wigan*

LONDON OFFICE:
11 John Street, London W.C.1
Telephone: Holborn 4183

HEYES & COMPANY LIMITED, WATER HEYES ELECTRICAL WORKS, WIGAN

dm HC.73

Standardised dimensions *in a nutshell!*



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METROVICK Type KN-B

Squirrel - cage Motors

METROPOLITAN-VICKERS
ELECTRICAL CO LTD · TRAFFORD PARK · MANCHESTER, 17

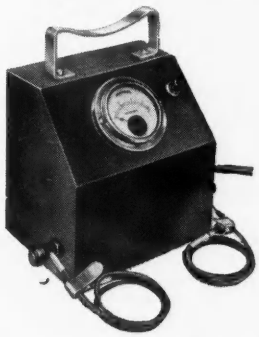
Member of the A.E.I. group of companies

JA 401

NEW ELECTRICAL EQUIPMENT

Earth Continuity Tester

A simple but comprehensive instrument which provides a handy method of checking the condition and degree of safety of electrical installations including conduit, switches and fixed and portable equipment is being marketed by SIMMONDS BROTHERS, Bedcote Mill, Birmingham Street, Stourbridge, Worcs. Designed for use on



"Simmonds" earth continuity tester

230/240 V a.c. the tester not only checks the continuity of an earth lead or connection, but is also arranged to indicate its resistance.

To operate it is only necessary to plug in to a convenient socket and connect the points to be tested to the two terminals by the leads and clips provided. The switch button is then depressed and after a short wait (about 15 sec), allowing for the meter needle to settle, the resultant meter reading in amps is converted to impedance in ohms by means of a table provided with the instrument.

In addition to its use for testing portable tools, it can also be applied to plant installed in fixed positions and general electrical installations. The price of the "Simmonds" tester is £11 11s.

Industrial Stethoscope

A new acoustical instrument for fault location has recently been placed on the market by the MURCHIE TRADING CO., LTD., 11, Kings Road, Sloane Square, London, S.W.3. Covering the entire sound range and beyond, the "Airsonic" has a high and uniform sensitivity to all frequencies from 20 to 7,000 c/s and it is claimed that it differs from other sound instruments in its ability to be tuned to a desired frequency by means of a resonance chamber of variable capacity. The operator turns a knurled knob until the signal is received at full strength. Parasitic sounds are automatically tuned out. This would not be practicable if the instrument had any fixed frequency of its own, but the "Airsonic" has no diaphragm and acoustically it is neutral.

The instrument will give sensitive "sound pictures" of the firing of an i.c. or a c.i. engine, test diesel injectors and pumps and detect wear or metal fatigue. It will also locate electrical faults in equipment under voltage and has numerous uses in the motor and aircraft industries and in almost every engineering workshop. Neatly accommodated with its attachments in a well-made case, the "Airsonic" is sold at £26 5s.

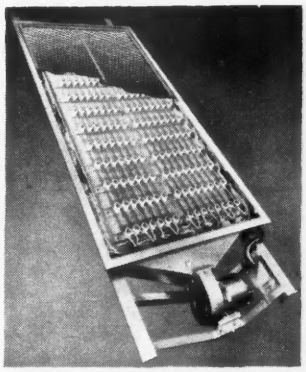
"Airsonic" industrial stethoscope

Radiant Heating Panel

A new heating panel with automatically controlled surface temperature has been introduced by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, for the continuous drying of all types of materials such as paper and fabrics, and for drying thin layers of powders and granules. It is also especially suitable for setting nylon fabric. The panel face is made of glass fibre fabric heated from behind by nickel-chromium coil elements to temperatures up to 300 deg C. The temperature is automatically controlled by means of an indicating controller with thermo-couples fixed to the panel face.

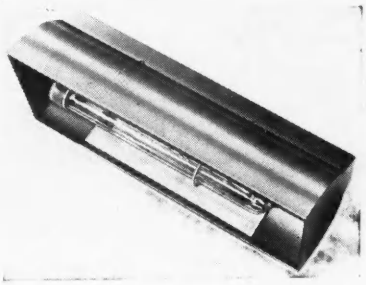
Panels are made up with mild steel sections thermally insulated at the back and an angle framework is provided to allow suspension of panels above the material to be heated. The panel surface is finished with flat expanded metal. They can be used as a radiant heating source but in order to increase the rate of heat transfer to a material a centrifugal fan is provided, and air ducting fitted in the back. A special form of diffuser is used to distribute the air flow evenly at the panel surface.

The panels are made in sizes from 2ft by 3ft to 4ft by 8ft, and are suitable for operation on d.c. or a.c. A panel 6ft by 3ft would have a rating of the order of 20 kW.



Above: New G.E.C. radiant heating panel

Below: B.T.H. sodium "cut-off" lantern



Adjustable Plug

Initially developed for demonstrators of electrical equipment, the "Pargo" variable plug, manufactured by P.A.R., LTD., 95, Talbot Street, Nottingham, is self-adjusting and fits all standard British and Continental sockets. For adjusting the plug spring loaded buttons in the sides are pressed until the pins align with the sockets.

The makers claim that the design of the plug ensures a firm connection. It is available in a plastic shockproof casing and retails at 6s 6d.

Bell Transformer

A transformer having an output of 2 A and suitable for domestic bells and chimes and for industrial use, has been introduced by GENT & CO., LTD., Faraday Works, Leicester. Priced at 18s it has a moulded black plastic base and a cream enamelled metal cover. The windings are vacuum impregnated with thermoplastic compound and are fully interleaved. The guarded terminals are totally enclosed by the cover. The transformer operates on the normal 200/250 V a.c. mains and has fused secondary tappings of 4 V, 8 V and 12 V.

Sodium "Cut-off" Lantern

An open "cut-off" lantern for either 85 W or 140 W sodium vapour lamps is now being made by the BRITISH THOMSON-HOUSTON CO., LTD., Crown House, Aldwych, London, W.C.2, for lighting Class "A" roads.

Producing a high intensity of glare-free light, the lantern may be used with installations of "non cut-off" sodium lanterns to unobtrusively increase the intensity of illumination over dangerous stretches of road. Optical control is by two weather-proofed concave, mirrored glass reflectors mounted internally on either side of the canopy. A main beam is provided at 70 deg, with "cut-off" between 75 deg and 80 deg from the vertical to conform with the B.S. Code of Practice CP 1004, Pt. 1, 1952.

The canopy of the lantern is made of bonderized sheet steel, zinc chromate primed and finished in aluminium paint. An aluminium casting with a 1¼in socket provides an anchorage for the lantern which is side entry mounted on a bracket arm and secured by two internal locking bolts.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s 8d each including postage) will be obtainable after 22nd September from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1949

1873. Dubilier Condenser Co. (1925), Ltd. —Electrical network coupling units. 12th January, 1950. (715671.)

2438. Dubilier Condenser Co. (1925), Ltd. (Dubilier, W.).—Electrical condensers. 28th January, 1949. (715672.) 25031. Electrical condensers. 29th September, 1950. (715674.)

1950

10672. Henley's Telegraph Works Co., Ltd., W. T., and Hoban, H. C.—Electric fuses. 27th April, 1951. (715677.)

16950. Marconi's Wireless Telegraph Co., Ltd.—Pulse modulation communication systems. 26th April, 1951. (715809.)

21030. Simplex Electric Co., Ltd.—Cooking stoves. 17th August, 1951. (715941.)

23627. Electric & Musical Industries, Ltd. —Electron-discharge tube arrangements. 24th September, 1951. (715681.)

25667. Siemens & Halske Akt.-Ges.—Unsymmetrical electrostatic deflection systems for cathode-ray tubes. 20th October, 1950. (715683.)

29310. Simplex Electric Co., Ltd.—Junction boxes for electric conductors. 28th November, 1951. (715944.)

1951

159. British Thomson-Houston Co., Ltd. —Electric remote control systems. 7th December, 1951. (715745.)

160. British Thomson-Houston Co., Ltd. —Three-phase magnetic core for stationary induction apparatus. 2nd January, 1951. (715946.)

5002. General Electric Co., Ltd.—Voltage breakdown devices. 29th February, 1952. (715685.)

6410. General Electric Co., Ltd., and Donelan, J. A.—Methods of and apparatus for electric spot welding. 17th March, 1952. (715686.)

6692. British Electrical & Allied Industries Research Association.—Arc shoots for electric switches or circuit breakers. 20th March, 1952. (715748.)

8625. Heinrich, D. O.—Electrostatic precipitators for the removal of dust from gases. 29th January, 1952. (715687.)

9001. Young, S. G.—Electric socket connectors. 15th July, 1952. (715751.)

9493. International Business Machines Corporation.—Circuit for use with electronic counting means. 24th April, 1951. (715753.)

14449. Metropolitan-Vickers Electrical Co., Ltd.—Electric-discharge apparatus. 3rd June, 1952. (715691.)

15081. National Research Development Corporation.—Method of and apparatus for counting electrical pulses. 5th May, 1952. (715816.)

18006. General Electric Co., Ltd., and Williams, C. E.—Circuit arrangements for operating low-pressure electric-discharge lamps. 29th July, 1952. (715693.)

18094. General Electric Co., Ltd., and Miles, E. E.—Manufacture of cathodes for electric discharge devices. 18th July, 1952. (715694.)

18234. Sunvic Controls, Ltd.—Thermally-operated electric switches. 16th July, 1952. (715695.)

18921. General Electric Co., Ltd., and King, D. La W. W.—Aerial systems. 10th November, 1952. (715957.)

20797. McCorquodale Colour Display, Ltd., Sanderson, J. C., and Irving, R. M.—Production of printed electrical circuits and elements for use in electrical circuits. 22nd August, 1952. (715697.)

20816. Anglo-Iranian Oil Co., Ltd., Hulf, H. J., and Withers, J. G.—Test instrument for high tension spark distributors. 25th August, 1952. (715898.)

21661. British Thomson-Houston Co., Ltd. —Pulse generating circuits. 5th August, 1952. (715826.)

21850. Balduzzi, F., and Steinemann, S.—Process for the production of ferro-electric titanates of the alkaline earth metals. 18th September, 1951. (715762.)

21980. British Thomson-Houston Co., Ltd. —Spark voltage transmitting or distributing devices for the ignition apparatus of internal-combustion engines. 7th July, 1952. (715960.)

23809. English Electric Co., Ltd.—Control apparatus for electric motors. 10th October, 1952. (715700.)

23810. English Electric Co., Ltd.—Control apparatus for electric motors. 10th October, 1952. (715701.)

24465. General Electric Co., Ltd., and Pickering, I. J.—Electromagnetic relays. 20th November, 1952. (715962.)

28471. Greminger, K.—Electric lamp fittings. 5th December, 1951. (715703.)

28724. Western Electric Co., Inc.—Semiconductive negative-resistance devices and methods of making them. 7th December, 1951. (715834.)

28765. Jeannin, R. A. A.—Electric cells and batteries. 7th December, 1951. (715903.)

28874. Philips Electrical Industries, Ltd. —Circuit arrangements for igniting two or more gas- or vapour-filled discharge tubes. 10th December, 1951. (715904.)

1952

2310. Stalhane, B.—Semiconductor circuits. 28th January, 1952. (715970.)

3056. Compagnie Générale de Télégraphie sans Fil.—Electronic matching of ultra-high-frequency lines. 5th February, 1952. (715842.)

3885. Marconi's Wireless Telegraph Co., Ltd.—Frequency selective circuit arrangements for use with video and like signals. 29th September, 1952. (715973.)

7232. General Electric Co., Ltd.—Apparatus for manufacturing voltage breakdown devices. 4th March, 1953. (715916.)

8939. Standard Telephones & Cables, Ltd. —Telecommunication exchanges. 13th March, 1953. (715985.)

10108. Brooke, R.—Thermally controlled electric switches. 22nd April, 1953. (715922.)

11427. Delaware Engineering Corporation. —Smoke and fume disposal in tilting electric furnaces. 6th May, 1952. (715852.)

13074. Revo Electric Co., Ltd.—Electric fan. 26th May, 1953. (715925.)

13826. Philips Electrical Industries, Ltd.— Electrolytic zinc plating. 30th May, 1952. (715993.)

14137. Sylvania Electric Products, Inc.— Lamp-basing machine. 4th June, 1952. (715857.)

14320. English Electric Co., Ltd.—Impulse wheel runners. 22nd May, 1953. (715858.)

15389. Marconi's Wireless Telegraph Co., Ltd.—Phase shifting circuit arrangements. 10th February, 1953. (715859.)

15723. Lucas (Industries), Ltd., J.—Electrical measuring, indicating or like instruments. 15th June, 1953. (715860.)

15793. Deutsche Edelstahlwerke Akt.-Ges. —Induction heating apparatus. 23rd June, 1952. (715714.)

16226. Algemene Kunstzijde Unie N.V.— Control system having asynchronous three-phase current machines with slip-ring rotors. 27th June, 1952. (715996.)

18688. Siemens & Halske Akt.-Ges.—Non-numerical telecommunication switching arrangements using relay line-finders. 23rd July, 1952. (715931.)

19552. Jackson Electric Stove Co., Ltd.— Cooking ovens. 3rd July, 1953. (715868.)

22610. Minnesota Mining & Manufacturing Co.—Solderless electrical wire connector. 9th September, 1952. (715872.)

23739. Renberles Products Co.—Electric ignition distributors. 22nd September, 1952 (716010.)

25430. Philips Electrical Industries, Ltd.— Indirectly heated electric-discharge tubes 10th October, 1952. (715794.)

25989. Philips Electrical Industries, Ltd.— Cathode-ray tubes comprising a luminescent screen. 16th October, 1952. (715724.)

30127. Siemens & Halske Akt.-Ges.— Apparatus for testing the magnetic properties of ferrous magnetic material. 27th November 1952. (716018.)

32149. Phrix-Werke Akt.-Ges.—Method of stretching filaments or filament cables. 18th December, 1952. (715799.)

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 21st August:—

CROMP-ARC. No. 725,149, Class 9. Electrical arc welding apparatus, electrical arc brazing apparatus, and parts included in Class 9 of these goods.—Crompton Parkinson, Ltd., Netherfield Road, Guiseley, near Leeds.

ERODUX. No. 728,187, Class 9. Electrical apparatus and parts all included in Class 9 and for use in the working of metals.—Wickman, Ltd., Banner Lane, Tile Hill, Coventry.

BARPRO. No. 729,198, Class 9. Electrical switches and electrical connectors.—Barrington Products (Leicester), Ltd., 48, Cank Street, Leicester.

INVERTRUNKING. No. 729,852, Class 9. Electrical conduit materials and fittings and connections therefor included in Class 9.—British Thomson-Houston Co., Ltd., Crown House, Aldwych, London, W.C.2.

ORTHOTRON. No. 728,761, Class 10. Electrical apparatus for use in X-ray therapy, and parts thereof included in Class 10.—Metropolitan-Vickers Electrical Co., Ltd., St. Paul's Corner, 1-3, St. Paul's Churchyard, London, E.C.4.

ELECTOMASTER. No. 719,875, Class 11. Air conditioning installations, freezing machines, refrigerators and cooking stoves, all being electrically operated; and parts included in Class 11 of all these goods.—Philco Corporation, Philadelphia, U.S.A. Address for service, c/o Stevens, Langner, Parry & Rollinson, 5-9, Quality Court, Chancery Lane, London, W.C.2.

DUOTHERM. No. 728,408, Class 11. Heat pumps, being contrivances for transferring heat from refrigerating apparatus to hot-water systems.—Brentford Electric, Ltd., Kidbrooke Park Road, Kidbrooke, London, S.E.3.

South Shields Trolley-buses

During the year ended 31st March last South Shields Corporation trolley-buses made a profit of £14,600 while the motor-buses lost £10,063. The net profit on the joint undertaking, after meeting various charges, was £4,315.

GENERATION AND DEVELOPMENT

The Guthega Dam, seen with the Snowy Mountains in the background, is expected to be completed and generating power by the end of the year

Snowy River Scheme

Muyang power station, Australia, the first section of the Snowy Mountains hydro-electric project to be completed, is expected to be generating 60,000 kW of power at the end of this year. The power station will be fed by the Guthega Dam and penstock lines will carry water more than 700ft down the mountainside to the turbines. In order to divert the Eucumbene River around the site of the Adaminaby Dam, which will be started this year, a tunnel 30ft in diameter has been excavated and will act as a spillway when the dam is completed. The control valves will be operated through a shaft over 400ft high.

Atmospheric Pollution Risks

At a meeting of Tyneside local authorities at Newcastle-on-Tyne on 6th August it was decided to ask for the expert opinions of the Ministry of Fuel and the British Electricity Authority on the risk of severe atmospheric pollution from the new Stella North and South power stations being built near Newcastle. Recently the Ministry of Housing suggested that no houses should be built on the nearby Union Hall Estate for several years until the amount of pollution was ascertained. At the conference, another letter from the Ministry was read which stated that existing communities would not be affected by pollution, but the Union Hall site was exceptional as parts of it were as high, and in some cases higher than, the power station chimneys. Under certain conditions, which were not likely to occur more frequently than on eighteen days each year, the higher parts of the estate might be exposed to 1·25 parts per million of sulphur dioxide. The Ministry stated that it was not yet possible to forecast the atmospheric pollution at ground level.

Belfast Surplus

The Electricity Department of Belfast Corporation had a gross profit of £503,761 on the 1953-54 year's working stated Mr. R. P. Watson, city electrical engineer and general manager, in his annual report submitted to the Electricity Committee on 4th August. The revenue from the sale of electricity and hire of appliances was £2,464,969.

The report stated that while the financial result of the year's working might be considered satisfactory, the effect of loan charges consequent upon the large development programmes in progress had not yet fully reacted upon the financial structure of the department. This made it prudent to continue in the meantime with the policy of allocating the major portion of the balance available to the redemption of debt. It was anticipated that the increasing sale of electricity would largely offset the mounting charges, but until the position became clearer the manager would not propose to consider a general revision of tariffs.

Capital expenditure during the year amounted to £2,599,162, and the total net capital outlay at 31st March amounted to £15,202,860. The net debt on the undertaking was £9,562,545. Sales of electricity in the Corporation's area of supply during the year was 395,310,090 kWh, an increase of 5·65 per cent.

Mr. Watson reported that the first of the two 30,000 kW turbo-alternators should be ready for service during the coming autumn, and that the erection of the second turbo-alternator was proceeding satisfactorily and should be available for the winter.

Cookers for Council Houses

As part of a council house modernization scheme Stamford Town Council has accepted the tender of the East Midlands Electricity Board for fifty cookers at the price of £27 14s 8d each and the installation of forty-two of the cookers at £219 6s 6d.

Douglas Engineer's Report

Mr. C. Anderson, the borough electrical engineer and manager of Douglas, I.O.M., reports that in 1953–54 there was an increase of £14,480 in revenue from the sale of electricity, etc., and a decrease of £632 in operating costs. The gross profit therefore rose from £48,573 to £67,556, but high interest and sinking fund charges transformed this into a deficiency which was limited to £15,274 by the temporary suspension of part of the sinking fund payments. Sales totalled 19·7 million kWh against 19·1 million in 1952–53 and the average price received per kWh sold was 2·464d (against 2·379d). The number of consumers served rose from 9,159 to 9,385.

Japanese Power Supply

One of the articles in an economic survey of Japan published by the *Financial Times* reviews the power supply position. At the end of September last, it states, the total generating capacity was estimated at 9,260 MW, of which 6,320 MW was hydro-electric and 2,930 MW thermo-electric. At present the largest hydro-electric plant has a rating of 75 MW, but a plant now under construction will have a capacity of 350 MW. The largest thermal station is of 300 MW capacity.

It is stated that the Government has held down the cost of electricity but that it will be difficult to avoid a substantial increase in the near future.

British Columbia Development

A conditional water licence is to be issued immediately to North West Power Industries for a big power development scheme in the Atlin Lake region of northern British Columbia. The licence will enable the company to proceed with a survey and other basic steps in the first stage of a $270 million development project along the British Columbia-Yukon border. The first phase will be the construction of an 880,000 h.p. hydro-electric smelting project 800 miles north of Vancouver. The first step will provide 120,000 h.p. by 1957, leading to the first major objective of 880,000 h.p. by 1962.

Turkish Electric Railways

It is reported by the *Monthly Journal of the British Chamber of Commerce of Turkey* that the first Turkish electric railway, a 24 km line between Istanbul (Sirkeci) and Soguksu, is now being constructed by a French firm. Plans are in hand for the electrification of the Istanbul–Ankara and Ankara–Zonguldak lines at a cost of £T200 million. The *Journal* says that French, German and Swiss firms are interested in these projects and that the contracts will provide for payment over ten years with interest at the rate of 6 per cent per annum.

As part of its publicity campaign to build up the cooking and water heating load the Jersey Electricity Co., Ltd., has entered into a contract with the local bus company for advertising on approximately half of its fleet

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Ashbourne.—31st August. U.D.C. Street lighting equipment. (See this issue.)

Basingstoke.—30th August. Park Prewett Group Hospital Management Committee. Electric lamps for the Hospital for six months. F. Hales, group secretary of the Committee.

Belfast.—26th August. Corporation Electricity Department. Portable fire fighting appliances for Power Station West. (See this issue.)

16th September. City Electricity Department. Metering equipment for power station. (See this issue.)

Brazil.—PORTO ALEGRE. 18th August. Companhia Carris Porto Alegrense. 100 electric trolley-buses. (E.S.B. 18630/54. Ten/10146.)*

Bridgwater.—27th August. Town Council. Electrically driven centrifugal pump for Ashford Waterworks. Borough engineer, Town Hall.

Canada.—WINNIPEG.—23rd August. City Hydro-Electric System. Transformers ranging from 37½ to 100 kVA. (E.S.B. 18702/54. Ten/10175.)* Power cable. (E.S.B. 18703/54. Ten/10176.)*

Dingwall.—North of Scotland Hydro-Electric Board. 11 kV and l.v. lines. (See this issue.)

Edinburgh.—North of Scotland Hydro-Electric Board. Electric lighting, heating and auxiliary cabling installation for Torr Achilty power station. (See this issue.)

33 kV switchgear for Fort William substation. Electric lighting, heating and plug points and auxiliary cabling for Finlarig power station. (See this issue.)

Ellesmere Port.—31st August. U.D.C. Street lighting equipment. (See this issue.)

Farnborough (Hants).—28th August. U.D.C. Street lighting equipment. (See this issue.)

Formosa.—TAIPEI.—31st August. Taiwan Power Co. Storage battery, Polyethelene insulated cable, and lighting fittings. (E.S.B. 18701/54. Ten/10152.)*

31st August. Taiwan Power Co. Copperweld grounding rods, copper busbars, tubes, generator neutral earthing equipment, lightning arrestors, power cable and accessories, insulated copper wire, etc. (E.S.B. 18800/54. Ten/10195.)*

1st September. Central Trust of China. Electric cable, lamps, terminals, etc. (E.S.B. 18812/54. Ten/10150.)*

Heywood.—30th August. Corporation. Street lighting equipment. (See this issue.)

Ince-in-Makerfield.—24th August. U.D.C. Electrical installations in 20 houses at Battersby Street. R. Lewis, surveyor, Town Hall.

India.—MADRAS.—30th August. Government Department of Electricity. A.c.s.r. and copper conductors. (E.S.B. 18650/54. Ten/10148.)* 9th October. Outdoor and indoor switchgear. (E.S.B. 18649/54. Ten/10161.)*

23rd August. Port Trust. Underground cable, feeder pillars and accessories. (E.S.B. 18648/54. Ten/10147.)*

CALCUTTA.—23rd August. Port Commissioners. Substation equipment for heavy cranes. (E.S.B. 18634/54. Ten/10140.)*

Keynsham.—31st August. U.D.C. Immersion heaters for 246 houses, Park West estate. (See this issue.)

Mexborough.—31st August. U.D.C. Duplicate booster pumps with motors and switchgear. Forms from Silcock & Simpson, consulting engineers, 10, Park Row, Leeds, 1.

Midlothian.—28th August. County Council. Street lighting equipment. (See this issue.)

New Zealand.—AUCKLAND.—27th August. Auckland Electric Power Board. Stranded cable. (E.S.B. 19290/54. Ten/10215.)*

WELLINGTON.—29th September. Posts and Telegraphs Department. Rotary switches. (E.S.B. 19084/54. Ten/10199.)*

Northampton.—Corporation. Electrical services in the Guildhall. (See this issue.)

Nuneaton.—27th August. Corporation. Street lighting equipment. (See this issue.)

Persia.—TEHRAN.—5th September. Procurement Office Joint Fund for Technical and Economic Development. Copperweld wire and communication transmitter. (E.S.B. 18885/54. Ten/10191.)*

25th September. Chemical Products Co. Two turbo-generators with boilers and spares. (E.S.B. 18797/54. Ten/10192.)*

Portuguese East Africa.—LOURENCO MARQUES.—24th August. Ports, Railways and Transport Department. Materials for the construction of two lines between telegraph and telephone stations. (E.S.B. 18245/54. Ten/10142.)*

St. Albans.—7th September. City Council. Electrical installations in 100 pre-war houses. (See this issue.)

Solihull.—27th August. Town Council. Street lighting, Stratford Road, Shirley. (See this issue.)

South Africa.—DURBAN.—27th August. City Council. E.h.v. substation switchgear. (E.S.B. 18826/54. Ten/10155.)*

JOHANNESBURG.—2nd September. Stores Department, South African Railways. Electric cable. (E.S.B. 19126/54. Ten/10200.)*

Sunderland.—23rd August. Town Council. Electrical installations in four shops and flats on the Hill View estate. Borough architect, Grange House, Stockton Road.

United States.—WASHINGTON.—25th August. Public Utility District, No. 1, Chelora County. Equipment for package station, including 3,750–4,687 kVA transformer, main breaker unit and three feeder units. (E.S.B. 18531/54. Ten/10133.)*

Ventnor.—23rd August. U.D.C. Installation of switchgear and wiring, and the provision of electrical equipment, at the pier-head, including the provision of main cables from the shoreward end of the pier. G. Poole, surveyor, Salisbury Gardens.

Wanstead and Woodford.—23rd August. Town Council. Lanterns in connection with signposting for the London through-route system. Borough surveyor, Municipal Offices, High Road, E.18.

Wellingborough.—6th September. U.D.C. Street lighting equipment. (See this issue.)

* Specifications may be inspected at the Export Services Branch, Board of Trade, Lacon House, Theobald's Road, London, W.C.1 (Chancery 4411; extension 769.)

ORDERS PLACED

Bridgwater.—Town Council. Extension of sodium street lighting.—G.E.C. and Standard Telephones.

Durham.—County Council. Rewiring at Cambridge House Hostel (£2,301).—North of England Engineering and Electrical Co., Ltd.

Manchester.—Corporation Housing Committee. Electrical installations in 42 flats and 292 houses on the Langley Estate.—A. J. Dyer & Sons, Ltd.

Swansea.—Corporation Parks and Entertainments Committee. Two electric cremators at the crematorium (£10,790).—General Electric Co., Ltd.

Sutton and Cheam.—Town Council. Accepted. Street lighting.—Cohen Bros. (Electrical), Ltd., Manchester.

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Altrincham.—Factory extensions, Woodfield Road; Budenberg Gauge Co., Ltd., Broadheath.

Aylesbury.—Factory; W. Moorhouse & Sons, Ltd., Old Lane, Beeston, Leeds, 11.

Bedford.—Extensions and improvements, Newnham Depot (£8,700) for T.C.; borough architect.

Blackburn.—Departmental store, Town Centre; Littlewood's Mail Order Stores, Ltd., 152a, London Road, Liverpool.

Brampton (Cumberland).—Light engineering works; Gulstad Manufacturing Co. Ltd.

Bristol.—Warehouse and offices, Stoke Croft; Michelin Tyre Co., Ltd., Boothen estate, Stoke-on-Trent.

Bury.—Extensions to works; Joseph Parker & Son, Ltd., bleachers, Elton Vale Works.

Chelmsford.—Central supplies depot and repair depot for transport department for Essex C.C. (£309,500); H. Conolly, county architect, County Hall.

Crawley.—Factory; Triefus & Co., Ltd., 32, Holborn Viaduct, E.C.1.

Crosby.—Public baths in Mariners Road (about £150,000), for T.C.; J. R. Fothergill, surveyor, Town Hall, Waterloo, Liverpool, 22.

Gainsborough.—Hostel for old people (£30,000), for Lindsey C.C.; county architect, Lincoln.

Gloucester.—Flats (26), School Lane, Quedgley; Vale & Kingsford, surveyors, 25, St. Aldate Street.

Hatfield.—Four standard factories; Hatfield Development Corporation, New Town House.

Liverpool.—Cheese factory at Brookfield Drive; Lovell & Christmas, Ltd., provision merchants, County Palatine Buildings, School Lane, 1.

Showrooms and offices, Broad Lane; Sevington Properties, Ltd., 52, Charles Street, W.1.

Ear, nose and throat theatre for Alder Hey Children's Hospital; Liverpool Regional Hospital Board, 88, Church Street.

London.—BERMONDSEY.—Men's Hostel, Spa Road; Salvation Army Trustee Dept., 113, Queen Victoria Street, E.C.4.

HAMPSTEAD.—Dwellings (22), Abbey Road; T. P. Bennett & Son, architect, 43, Bloomsbury Square, W.C.1.

HOLBORN.—Office block, Theobalds Road and Southampton Row; Marcus Estates (Kingsway), Ltd., 93, Park Lane, W.1.

SOUTHWARK.—Factory and offices; H. J. Searle & Sons, Ltd., 70/78, Old Kent Road, S.E.1.

Newcastle-on-Tyne.—Bottling factory, Hill Street, for Newcastle Breweries, Ltd., Haymarket, Newcastle (£650,000).

Factory at Fawdon (£1,000,000); Rowntree & Co., Cocoa Works, York.

Manchester.—Works extensions; Walkden, Makin & Co., Ltd., Clayton Lane, Openshaw.

Rickmansworth.—Houses (82), on the Berry Lane estate, for U.D.C.; C. G. Ransome Williams, clerk, Council Offices.

Whittlesey.—Community centre, new Drybread Road estate, for U.D.C.; Ruddle & Wilkinson, Longcauseway Chambers, Peterborough.

BATTERY CHARGERS

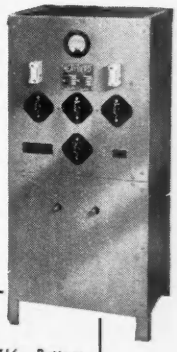
HEAYBERD BATTERY CHARGERS, incorporating metal rectifiers, embody the results of more than 25 years' experimental work and the understanding of customers' special requirements.

No matter how large or small, we shall be glad to quote for Battery Chargers made to suit your own particular purpose.

The following lists are obtainable on request:

No. 1048 Describes over thirty different types of Battery Chargers.

No. 1046 Describes heavy duty Mobile Battery Chargers.



The photograph shows a Heayberd Model 6716 Battery Charger for charging from 3 to 36 cells at two to sixteen amps.

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The high-speed file is easy to guide, and permits cutting clear up to the commutator risers.

Can be used on commutators of all sizes above 4" diameter, without removing the Brush Arms.

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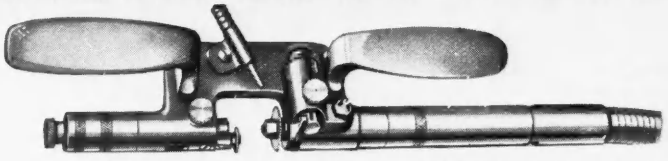

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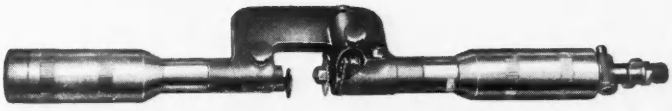
is for fast efficient "V" or "U" slotting and alternative heads and handpieces can be used for driving rotary burrs, files, mounted grinding points, polishing mops, wire brushes, sanding discs, etc.

A most efficient electric machine for both portable and shop use for commutators 6" diameter and upwards.



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For the transmission, direction and diffusion of light there is still no medium to equal the efficiency and durability of Glass. It does not distort, burn, scratch or discolour and does not deteriorate with age. Our Glassworks are devoted exclusively to the production of Lighting Glass of the finest quality and we can really say that we are specialists. Increasing demands for "Hailware" Lighting Glass called for an extensive programme of re-equipment and expansion of our Glassworks. This has been completed and we now have one of the most up-to-date plants specialising in the manufacture of Lighting Glass, thus we are enabled to offer a much improved service to our many customers.

We would emphasise that every type of Lighting Glass we produce is melted in Pots and not in Tanks, in consequence our Glassware has just that extra bit of "quality" about it and gives, too, increased light output, good colour, finish and freedom from blemishes. This, no doubt, is one of the reasons why "Hailware" Lighting Glass is being increasingly specified for Lighting Installations both at home and abroad.

Of the types of Glassware we manufacture, three ply Opal is the one in greatest demand, and we have moulds for producing, in every size, most of the popular shapes now in use. We can also supply these in Coloured Opal or Clear Glass and with applied decoration when required. In addition, we have now in production a useful range of glasses and lenses in various colours for Signal purposes, the colour is actually in the glass and they are available in Ruby, Green, Blue, Amber and White.

We make numerous other types of Lighting Glasses, in short, wherever there is a Light Source that requires shielding or diffusing, whether it be in the home, office, school, factory, ship, coach, switchboard, etc., we can produce the necessary globe, shade or lens. We are always pleased to quote for special requirements, so if you have any Lighting Glass problems, remember we are at your service.

HAILWOOD & ACKROYD LTD. *The Glass Manufacturers*

BEACON WORKS - MORLEY - YORKS Phone: Morley 571-2
and 18 LOWNDES STREET - LONDON - SW1 Phone: Sloane 0471-2

Was this YOUR fault?

Don't take chances - choose METROVICK protection

A little trouble on protecting heavy duty generating equipment goes a very long way. Sensitive Metrovick relays respond at the first signs of irregularity, protecting the plant from serious damage and ultimate failure. The technical service offered by Metrovick engineers on problems of electrical plant protection remains unsurpassed.

Metrovick relays for generator protection.

Longitudinal differential
Transverse differential
Time graded overcurrent and/or earth fault
Instantaneous restricted earth fault
Phase unbalance
Over-voltage
Field failure
Rotor earth-fault, etc.

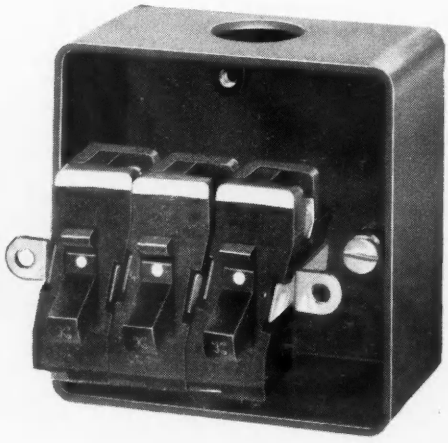
METROPOLITAN-VICKERS
ELECTRICAL CO LTD · TRAFFORD PARK · MANCHESTER, 17

Member of the AEI group of companies

Safeguarding Electrical Equipment

G/A407

3 into 1 WILL go



Not what they teach at school maybe, but true never the less. One, two or three . . .

KERSON

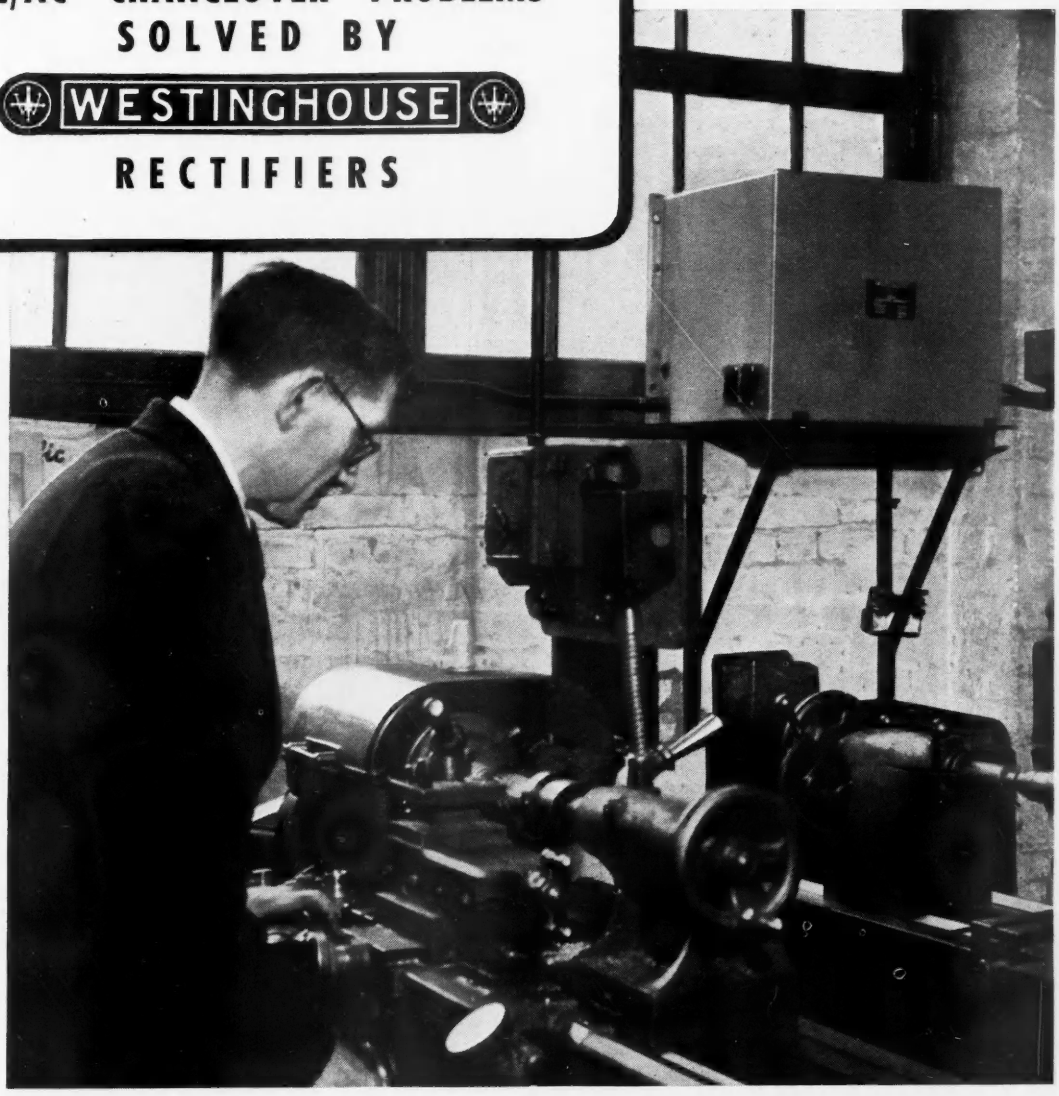
5 amp 'UNI QUAIL'

. . . A.C. switches will go into a one GANG B.S. 1299 Box. This unique unit design enables assortments of one, two or three gangs for either one-way or two-way switching to be easily assembled on a standard strap with complete interchangeability. The 'Uni-Quail' Switch, with all moulded body and actuating dolly, incorporates an exceptionally smooth (A.C. only) switch movement rated 5 amps. Easy-wiring terminals accept up to a maximum of two 3/.036 conductors.

The widespread popularity of Kerson products is proof positive of their high quality and reliability.

THE KERSONS MANUFACTURING Co. LTD.
HANSONS BRIDGE ROAD, BIRMINGHAM 24
Phone: ASHFIELD 1163-4-5 Grams: "KERSONS, PHONE, BIRMINGHAM"

DC/AC CHANGEOVER PROBLEMS SOLVED BY WESTINGHOUSE RECTIFIERS



The illustration (by courtesy of Messrs. Self Engineering Co. Ltd.) shows a lathe powered by a DC motor operating from a "Westalite" rectifier, and is one of the many installations carried out by the London Electricity Board in the DC/AC changeover in the South-East area of London.

By connecting a "Westalite" rectifier of the required output between the AC supply and the existing DC equipment, operations carry on as normal. It is as simple as that. Extensive ranges of single- or three-phase "Westalite" rectifiers for all industrial applications are available and are listed in Data Sheet No. 802. Write for a copy to the address below:

WESTINGHOUSE BRAKE & SIGNAL CO. LTD.

Dept. E.R.14, 82 York Way, King's Cross, London, N.1

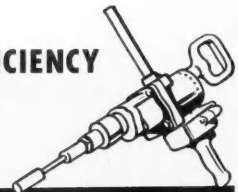
Photo by courtesy of Wm. Niell & Sons Ltd.

TUBE EXPANDING?

Hicycle handles 1760 ends per day

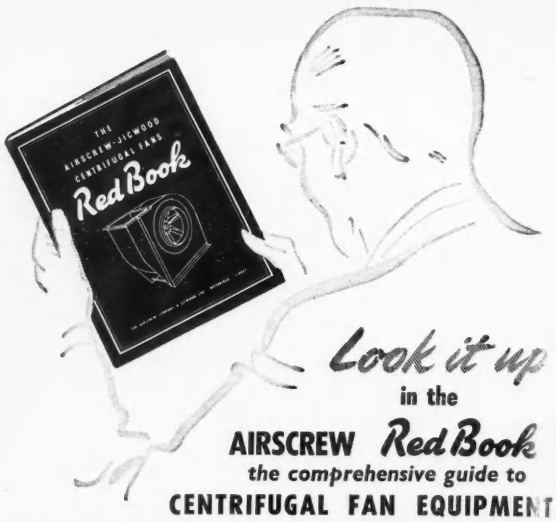
Three days were saved in expanding this nest of 880 tubes for a high pressure heat exchanger. The work called for the expansion, at each end, of $\frac{3}{4}$" outside diameter 14 gauge steel tubes. Changing to a Hicycle tool for this operation reduced the time taken on each "nest" from nearly four days to ***only one day***. Here is yet another example of the contribution which Hicycle tools make on really hard-going production work. Write for Brochure No. 354 which gives full details.

FOR Hicycle EFFICIENCY
CALL IN



Consolidated

CONSOLIDATED PNEUMATIC TOOL CO. LTD.
LONDON & FRASERBURGH. Reg. Offices: 232 Dawes Road, London, S.W.6. Offices at Glasgow • Newcastle • Manchester Birmingham • Leeds • Bridgend • Belfast • Dublin • Johannesburg Bombay • Melbourne • Paris • Rotterdam • Brussels • Milan, and principal cities throughout the World.



Look it up in the
AIRSCREW *Red Book*
the comprehensive guide to
CENTRIFUGAL FAN EQUIPMENT

Airscrew are pleased to announce that their 'Red Book' of Centrifugal Fans is now off the press and can be sent to you post free. Fan Engineers are invited to write for a copy of this complete guide to air movement problems. The 'Red Book' is similar in composition to its companion, the Airscrew 'Blue Book' of Axial Flow Fans, and comprises:—

1. Introduction to Centrifugal Fans: Fan Selection, General Specification, Coding Information, Arrangements for Drive, Bearings, Finishes, Tables, etc.

2. Specifications and Performance Tables: (*a*) Forward Curve; (*b*) Paddle Blade; (*c*) Backward Curve.

Fan Application Engineers will find this Airscrew 'Red Book' an invaluable reference in all problems that involve the use of Centrifugal Fans.

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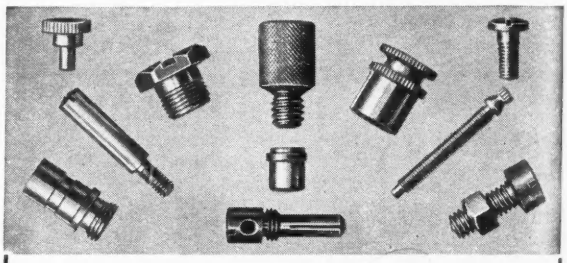
To get your copy of the Airscrew 'Red Book' write under your Company letter-heading or send a Trade card to:—
THE AIRSCREW COMPANY & JICWOOD LTD., WEYBRIDGE, SURREY



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ELECTRICAL SCREW LTD
Belfast Road, Stoke Newington, N.16

CONDUIT FITTINGS & FLEXIBLE TUBING

For Quality and Service, specify F.A.P. with confidence. A full inspection on the complete range

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VINCENT PARADE, BIRMINGHAM 12

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PRISMATIC FITTINGS

IN ALUMINIUM ALLOY

The Natural Selection for all installations

List No. SY.10 100 watt

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Always better than they have to be

CATALOGUE AVAILABLE ON REQUEST

MANUFACTURED AT **HILLINGTON, GLASGOW, S.W.2**

by **J. & G. COUGHTRIE Ltd.**

Specify "CASTLE" TUBES and COMPONENTS

—manufactured entirely at our Guildford Mills

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Vulcanised Fibre Ltd

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MAKERS OF "CASTLE" VULCANISED FIBRE SHEETS, RODS, TUBES AND LEATHEROID

no nut can turn

When it is essential that a nut remains tight, use a **GROVERLOK** spring lockwasher which has been continuously manufactured by us since 1875.

We also make square and flat section washers.

Write for fully illustrated leaflet to Department W.

GROVER & CO LTD

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★ *Of special interest to manufacturers of Fluorescent Fittings and Appliances*

TERMINAL BLOCKS

CONNECTORS

No. 402

No. 712 5 amp. No. 812 10 amp. No. 912 15 amp.

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No. 602

Please write for Quotations and Samples

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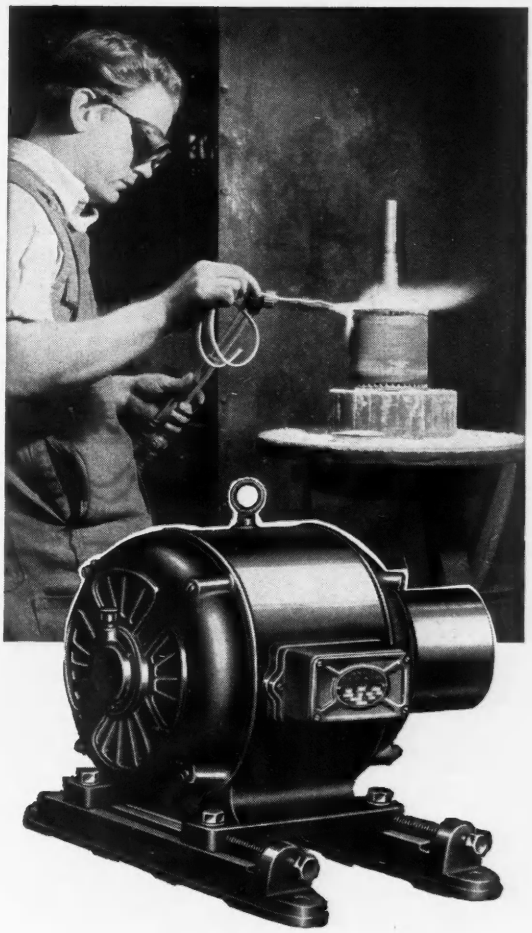
Phone: CITy 3182



Assembling the unknown quantity

Some people think all electric motors are alike. They argue that standard parts and standard specification mean standard performance. But they overlook the fact that there's no specification laid down for manufacturing skill and design experience. Motors which incorporate these factors give years of service at full output.
EVERY Howells motor has that pedigree. Each one possesses built-in QUALITY—which means trouble-free service and minimum depreciation. If dependable electric motivation is of interest to you, why not write to-day for information on the HOWELLS range?

POWER BY
HOWELLS
(ELECTRIC MOTORS) LTD
HANLEY · STOKE-ON-TRENT
Branches at:
LONDON · MANCHESTER · BRISTOL
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dm HE67

REASONS

CHLORVAR III is a varnish which will withstand FIRE RESISTING CHLORINATED COOLING FLUIDS such as are now used in transformers.

COVAR I is a varnish which will withstand CUTTING OILS, ESTERLUBRICATING OILS AND CHEMICAL FUMES. It is a perfect insulator under most stringent conditions.

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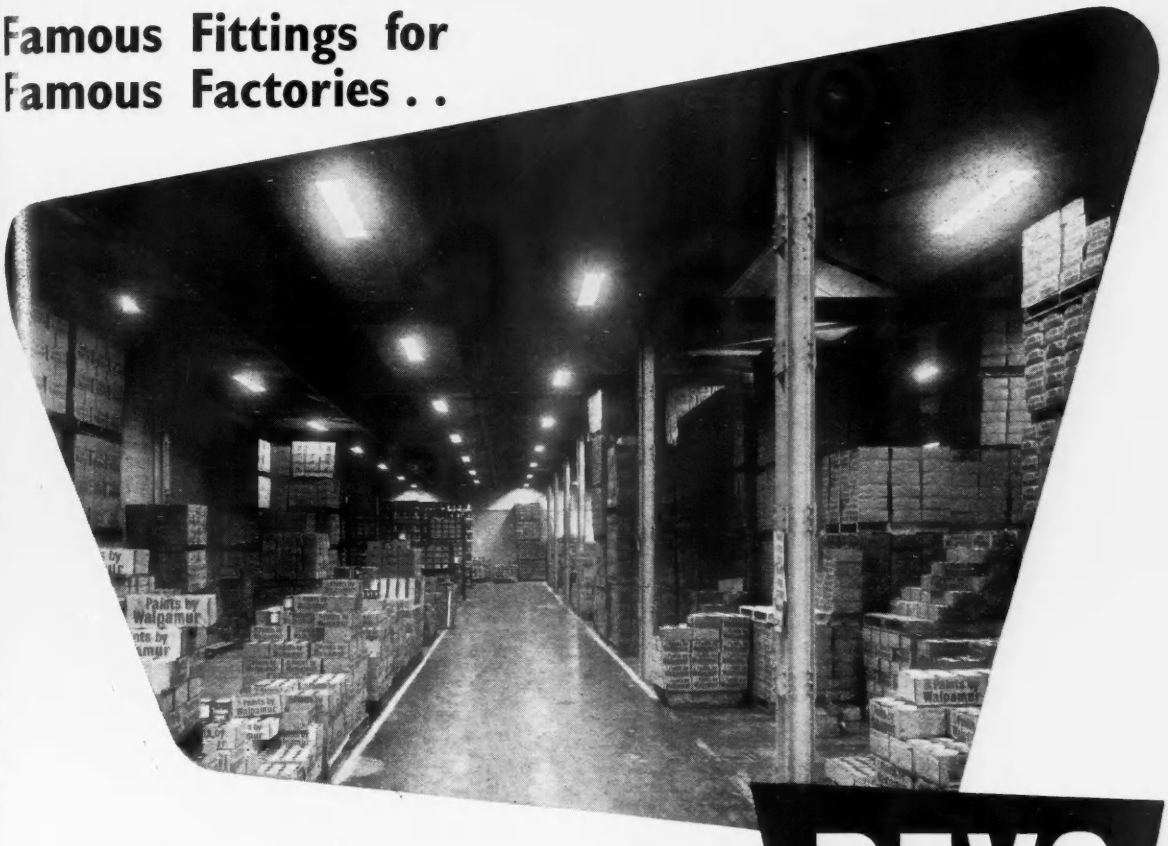
Famous Fittings for Famous Factories . .



WALPAMUR chooses REVO REGD.

Like many other important manufacturers, the Walpamur Co. Ltd., selected Revo Fluorescent Fittings for the efficient lighting of their premises at Darwen.
Over 400 fittings have been installed in the factory and offices and the accompanying photograph shows a section of the stock room and forwarding department where the well known Revo "Trufolite" units have been installed, each using one 5 ft. 80 watt fluorescent lamp.

★ ★ ★

The services of the Revo Lighting Department are available to clients and the company's engineers will be pleased to advise on any lighting problem or prepare schemes for proposed installations without obligation.

TRUFOLITE REFLECTOR FITTINGS

Revo "Trufolite" Fluorescent Fittings are supplied for one or two 40 watt, 4 ft. and one, two or three 80 watt 5 ft. Fluorescent lamps and can be arranged for chain, tube or direct mounting separately or in continuous lines.

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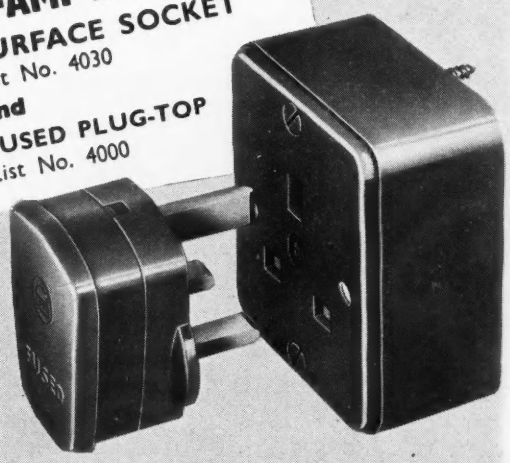
Branches at: LONDON, MANCHESTER, CARDIFF, GLASGOW, LEEDS, NEWCASTLE-ON-TYNE, BELFAST, DUBLIN

Electric Cookers, Domestic Appliances, Public and Industrial Lighting Equipment, Switch and Fusegear, Electric Fans

Yet another NEW BECKER development!

13-AMP RING MAIN SURFACE SOCKET
List No. 4030
and
FUSED PLUG-TOP
List No. 4000



—incorporating these special features :—

- Conforms with British Standards Specifications where relevant
- Shuttered for safety in accordance with latest recommendations
- Robust construction, using high-grade anti-tracking moulding powders
- Specially designed contacts of high current carrying capacity
- Complete with two No. 6 x 1¾" wood screws for easy fixing

It pays to buy the best!

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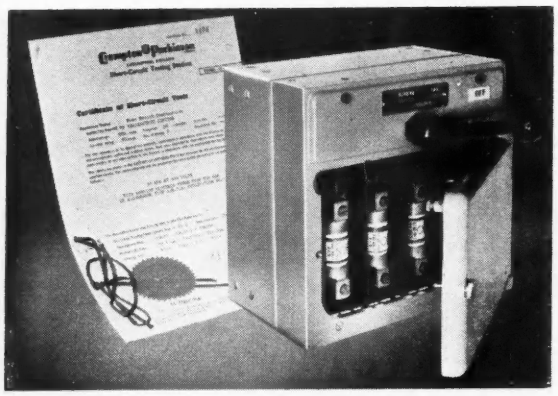
For full details of the entirely new BECKER range write or phone :—
GEO. BECKER LTD. AMPERE WORKS, NORTH END ROAD, WEMBLEY PARK, MIDDX: WEMBLEY 8651 (3 lines)



Modern Installations demand cubicle pattern switchgear – with proved performance, of course.

The Varilectric range of units, from 60 A. to 750 A., has been A.S.T.A. tested at 30 MVA.

VARILECTRIC LIMITED
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LONDON, S.E.15

Tel. Nos.: RODNEY 3960 & 5198

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IT'S NEW!

It's SCEMCO PLASTIC LOUVERING

No limit to louvering areas, and delivered in easily assembled sections. It can be cut to any shape.

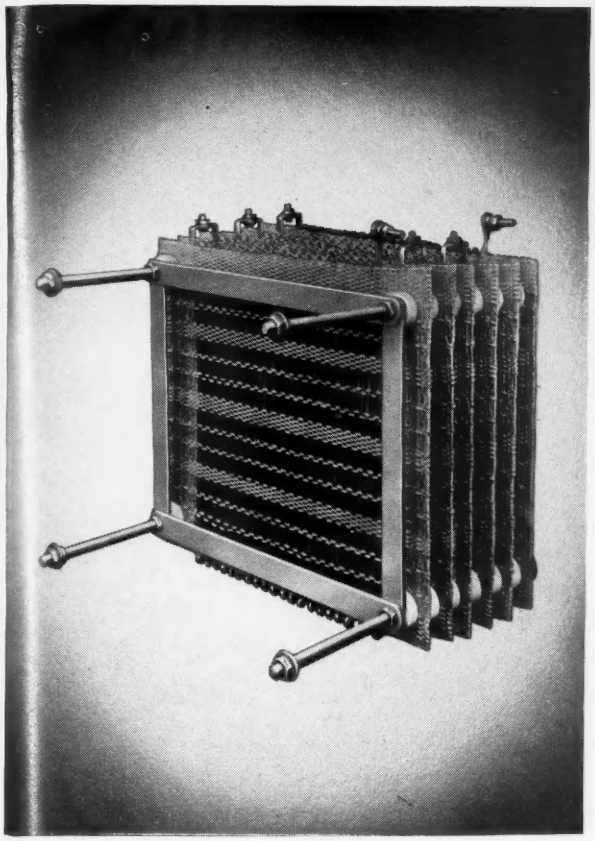
Beautifies and attracts with its very modern concealed lighting effect.

- *Light, rigid, attractive*
- *Does not tarnish*
- *Easy to fix*
- *Competitive in price*

No limit to size available
— for use with Scemco fittings

Send us the measurements — we do the rest . . .

SCEMCO LIMITED
ENGLAND'S LEADING FLUORESCENT LIGHTING SPECIALISTS.
SOHO STREET · LONDON W1 · *Tel:* GER 1461-2-3



BANKINGS

ELECTRICAL RESISTORS *and* HEATING ELEMENTS

Birch

REGISTERED TRADE MARK

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Northern Area Office: 50 LIME ROAD, ACCRINGTON. Telephone: ACCRINGTON 4860

ASBESTOS WOVEN RESISTOR GRIDS
ASBESTOS WOVEN HEATING NETS
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DIMMING RESISTORS STUD TYPE
FIXED RESISTORS SLATE WOUND
FIXED RESISTORS TUBULAR
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LOADING RESISTORS
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RESISTOR UNITS MICA WOUND
RESISTOR UNITS PORCELAIN WOUND
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STUD TYPE RESISTORS SHUNT
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SLIDING RESISTORS TUBULAR
STRIP HEATERS METAL CASED
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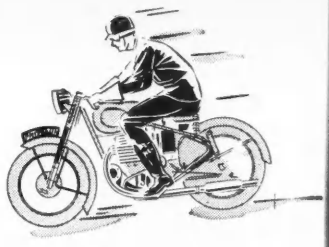

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PAPER INSULATED POWER CABLES FROM 660 TO 11,000 VOLTS

Connollys can offer that individual attention which is needed when you have a "Power Problem".

STOCK ITEMS

Paper Insulated, Lead Alloy "E" Sheathed, to BS 480: 1942. 660 volts, Shaped Conductors in lengths of 500 yards.

5,000 yards	·0145 sq. in. Twin
5,000 yards	·0225 sq. in. Twin
2,000 yards	·04 sq. in. 4 Core
1,000 yards	·06 sq. in. 4 Core
1,000 yards	·10 sq. in. 4 Core

These cables can be Protected or Armoured to customers' requirements within 7 days. Non-stock items can be manufactured and despatched in 14 days. May we have the pleasure of receiving your enquiries?

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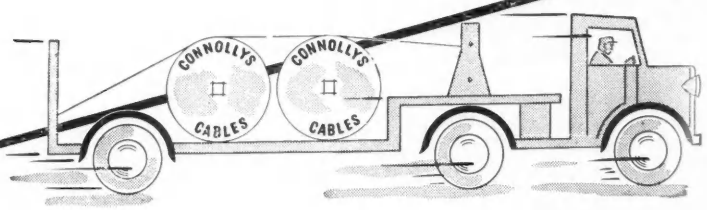

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Founder member of the C.M.A.

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EXTRA SHARP PICTURE

THAT'S not what we meant! Why can't our artist draw what he's told instead of always trying to be the funny man!

All we want is a nice realistic drawing of a pretty girl showing the extra sharp picture you get on a Philips Television Set. Now is that *clear?*

Readers will already know about Philips extra sharp television pictures — which give *all* the detail. May we, however, remind them that Philips also make a vast range of other electrical apparatus — a selection of which is shown as a border to this advertisement.

PHILIPS

PHILIPS ELECTRICAL LTD., CENTURY HOUSE, SHAFTESBURY AVENUE, W.C.2

'PHILISHAVE' ELECTRIC DRY SHAVERS · 'PHOTOFLUX' FLASHBULBS · TAPE RECORDERS · ELECTRO-MEDICAL APPARATUS

(P.361C)

"Overhead Busbars — a snip for mass production"

says Mr. Block the Barber
of "Happy Families" fame

"How do you mean?", we asked. Having solved three political crises, given us the winner of the 2.30 and told his latest story, he went on to say— "Follow the example of the Rolls Razor Factory : observe how Fused Tapping Boxes plugged to Overhead Busbars make electric power available everywhere."
Fit Busbar Trunking, the most modern and adaptable method of electric power distribution in the world. Economical to instal, easy to alter and extend with a minimum interruption of the electric power supply. Make sure *your* Production Engineers are a "happy family" by letting Busbar Trunking take care of your power distribution.

BUSBAR TRUNKING

the modern system of electric power distribution

Standard Ratings:—175, 250, 300, 400, 500, and 600 amps

Write for catalogue B.B.T. 971

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Telephone ABBey 5095 Telegrams Busbar Sowest

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B.V.C
"BRITISH VACUUM CLEANER"

INDUSTRIAL
VACUUM CLEANERS

If you have a problem of conveying extraction or removal of Dust or light Materials Consult B.V.C.

The British Vacuum Cleaner & Engineering Co. Ltd.
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Phone : ASHtead 866

MODEL TL1. A strongly-built machine recommended for Hotels, Schools, institutions, large houses, etc.

MODEL T23X. A compact but powerful general-purpose machine for factory use. Cyclone top to prevent clogging or for wet floors.

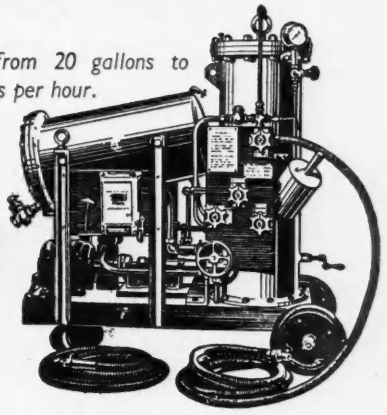
MODEL TL2. Specially designed for use in Cinemas where a narrow machine is required for use between rows of seats.

MODEL T87. Designed for cleaning Lancashire and other large boilers, furnaces and Gas Works retorts. Handles heavy smouldering dust.

TRANSFORMER AND SWITCH OILS

Complete Drying and Purification giving Maximum Breakdown Voltage in one simple operation. No heating. No fire risk. Weatherproof. Fully mobile units. Used by leading Electricity Undertakings throughout the World.

Capacities from 20 gallons to 1,000 gallons per hour.



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THE METAFILTRATION COMPANY LIMITED
BELGRAVE ROAD, HOUNSLOW, MIDDLESEX
★ *PHONE : HOUNSLOW 1121/2/3*
GRAMS : METAFILTER, HOUNSLOW

dependable
ELEMENTS
for every job

Stocked by Leading Wholesalers

THE
ELECTRIC ELEMENTS CO.
Tokenhouse Yard, Nottingham

Makers of Elements since 1921

1 PUMP FOR DEEP AND SHALLOW WELLS

The GODWIN *Jet-Pump*

Capacities from 200-2700 GPH according to conditions

H. J. GODWIN LTD
QUENINGTON · GLOS
Phone: Coln St. Aldwyns 271 (5 lines). Grams: "Pumps, Quenington"

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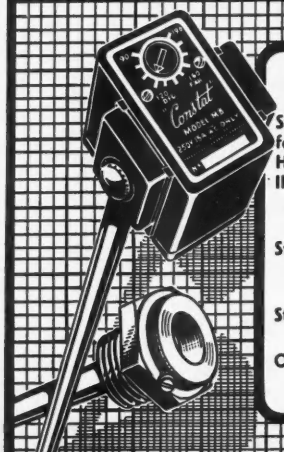

MODEL "MB"

STEM TYPE THERMOSTAT for control of IMMERSION HEATERS, PLATENS, DRYING OVENS, Etc.
Suitable for 15 amps, 250 V. A.C. only.
Standard Instrument 11" stem with ½" B.S.P. pocket.
Standard range 90/190° F and 30/90° C.
Other lengths and scales available

THE THERMOSTATIC CONTROLS Co
AVENUE ROAD·HAMPTON·MIDDX.
TELEPHONE: MOLESEY-3285/7

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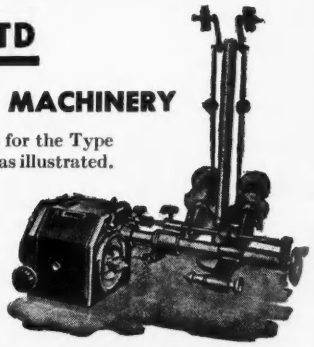
COIL WINDING MACHINERY

We invite your enquiries for the Type A1/1 automatic machine, as illustrated. For which prompt deliveries can now be made. Also for the Type H/1 hand coiled winder and Type AW/1 Armature Winding Head.



73 UXBRIDGE RD., EALING, LONDON, W.5. *Tel.: EALing 8322*

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GENERATING PLANT

Supplied with either diesel or petrol engines, sizes from ½–500 kVA, Hampson Generating Sets provide a dependable source of electricity for domestic, agricultural or industrial requirements. Sets can be arranged for automatic operation upon failure of the mains, in addition to the standard methods of control, which are: (1) Fully automatic; (2) Remote; (3) Hand start and stop; (4) Electric start. All available for early delivery.

HAMPSON INDUSTRIES LTD.
WEST BROMWICH, ENGLAND. Cables: "Hampgear, West Bromwich"
Manufacturers of the largest range of Generating Plant in the World

AIREDALE
ELECTRICAL & MNFG. CO., LTD.

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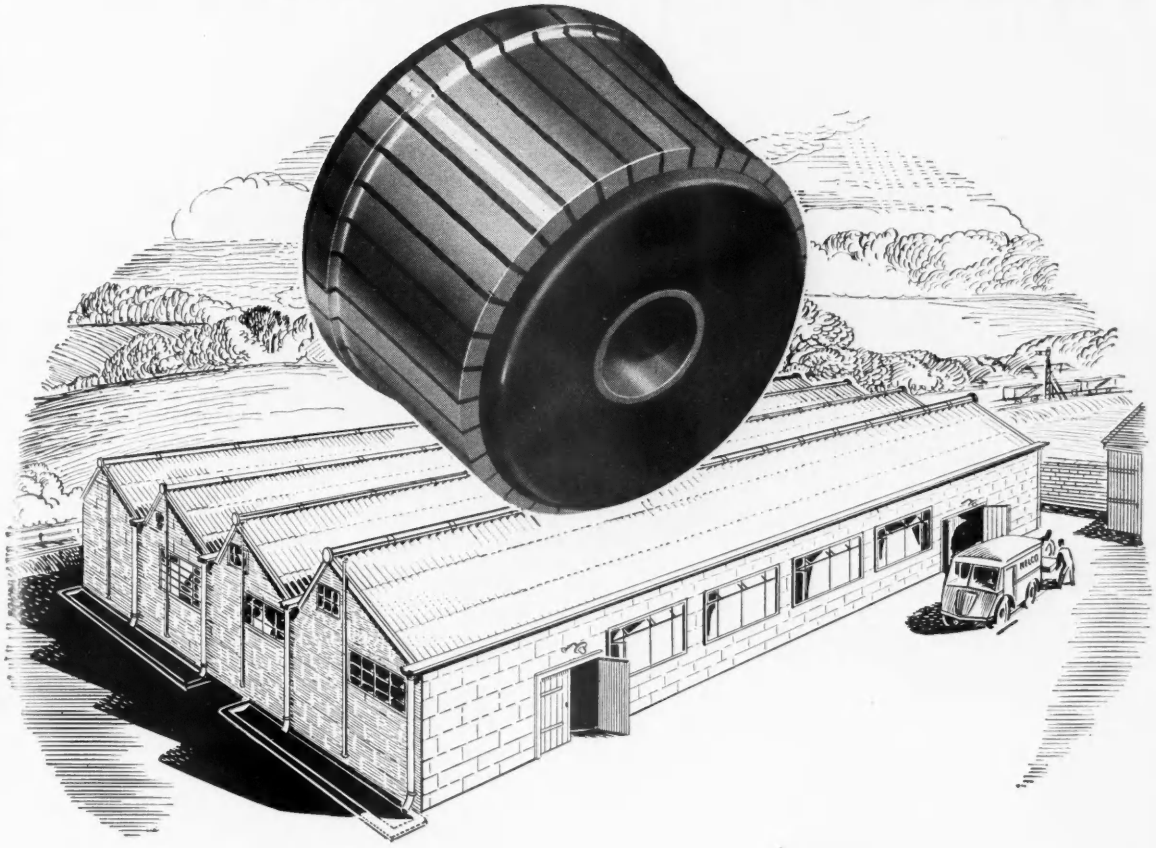

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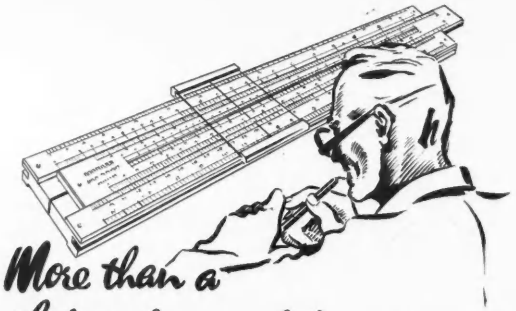

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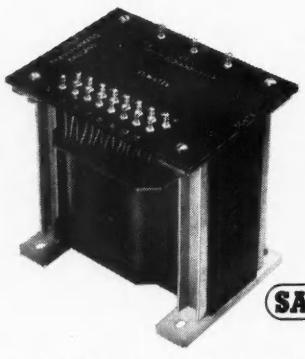

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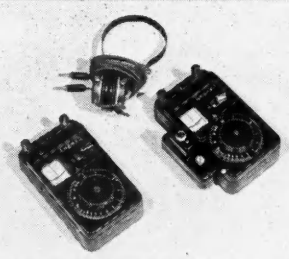

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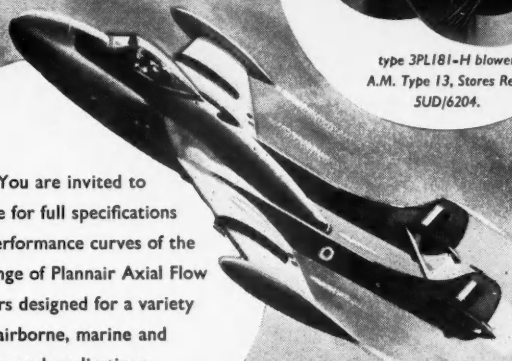

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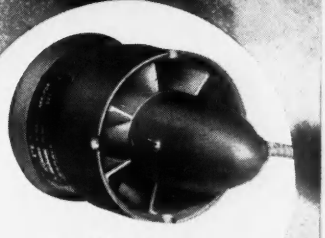

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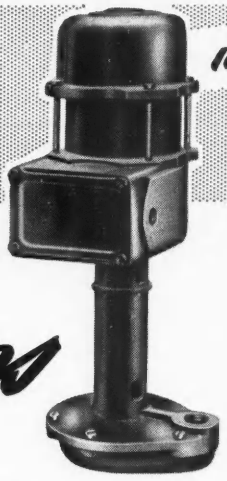

IMMERSED TYPE

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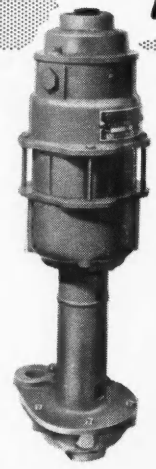
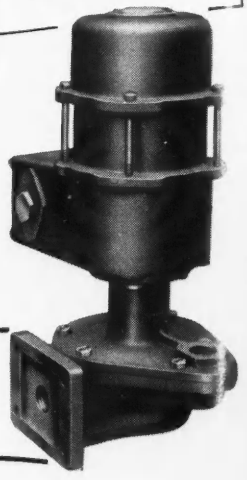
'T' TYPE FOR EXTERNAL MOUNTING





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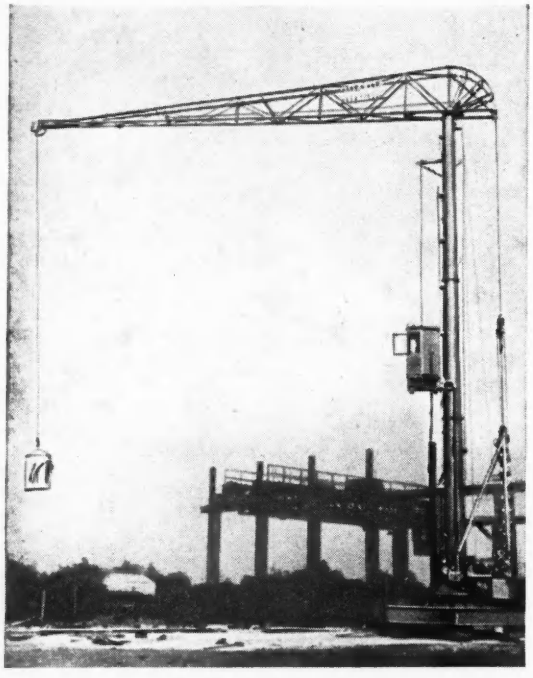

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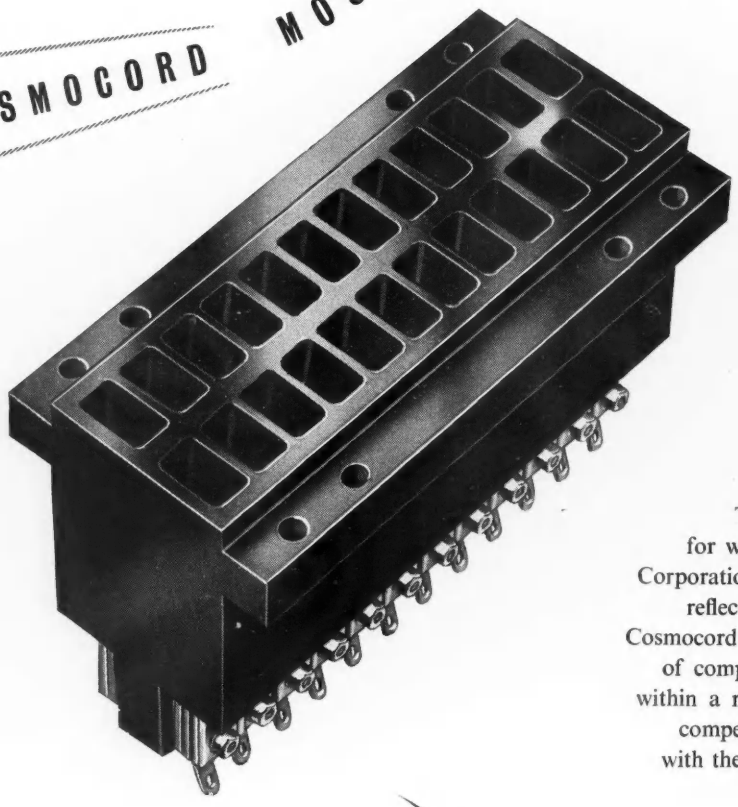

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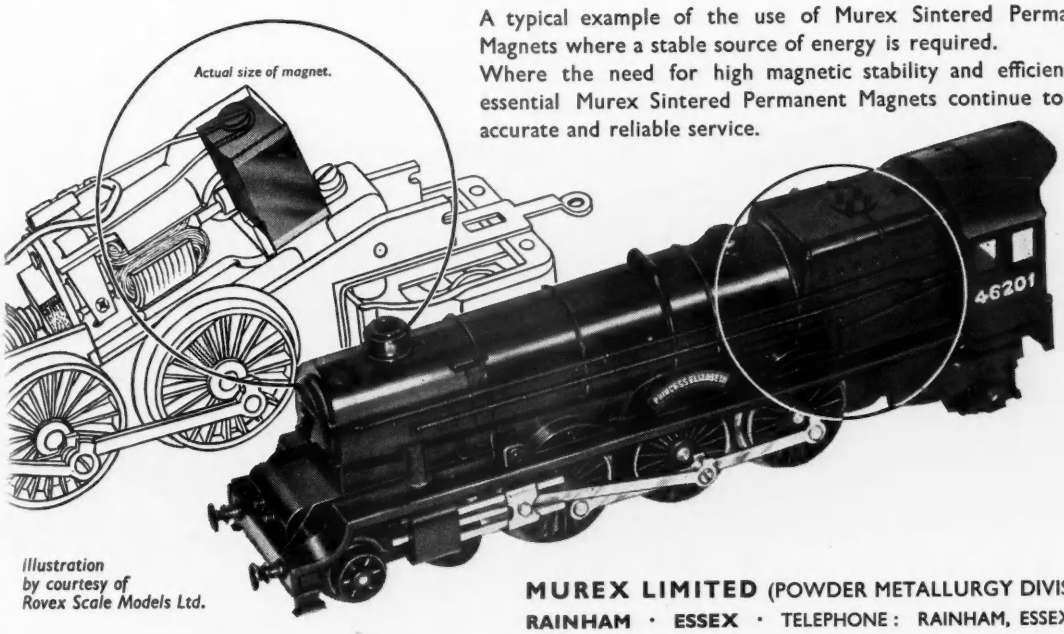

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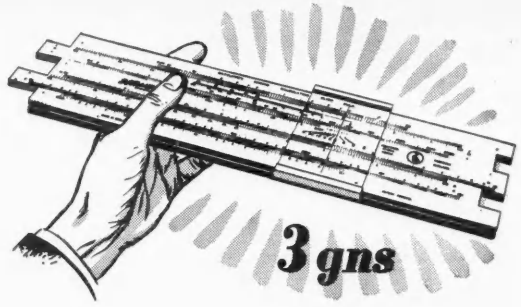

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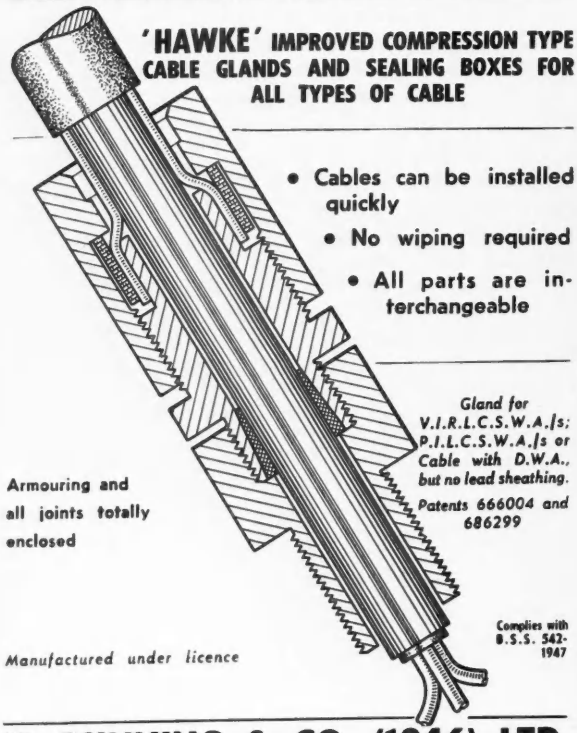

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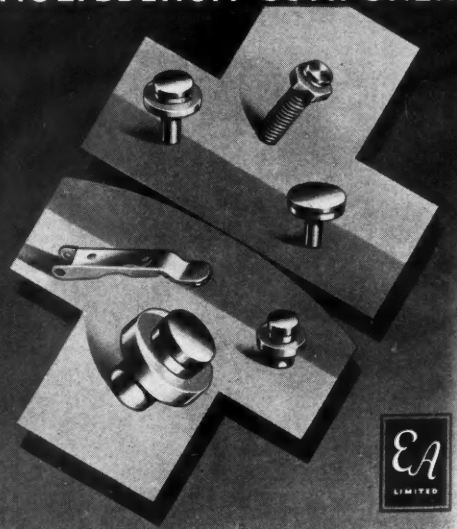

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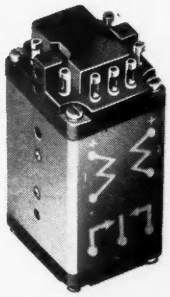

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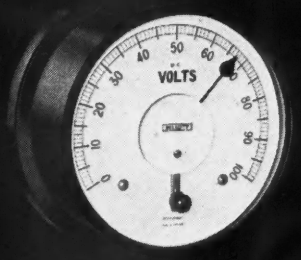

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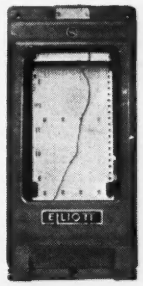

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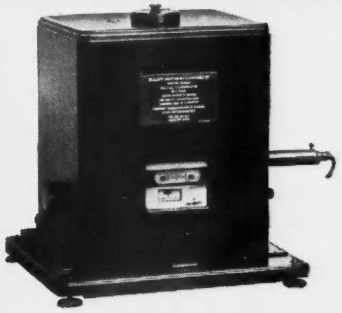

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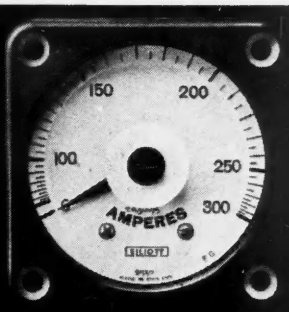

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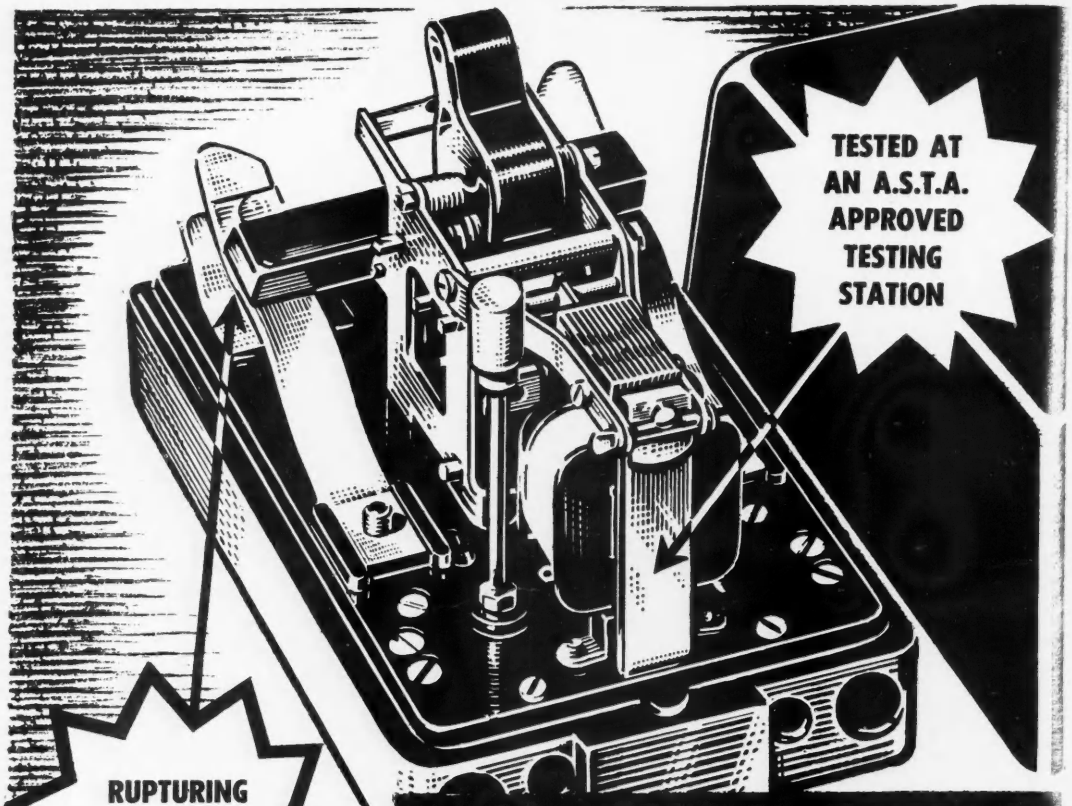

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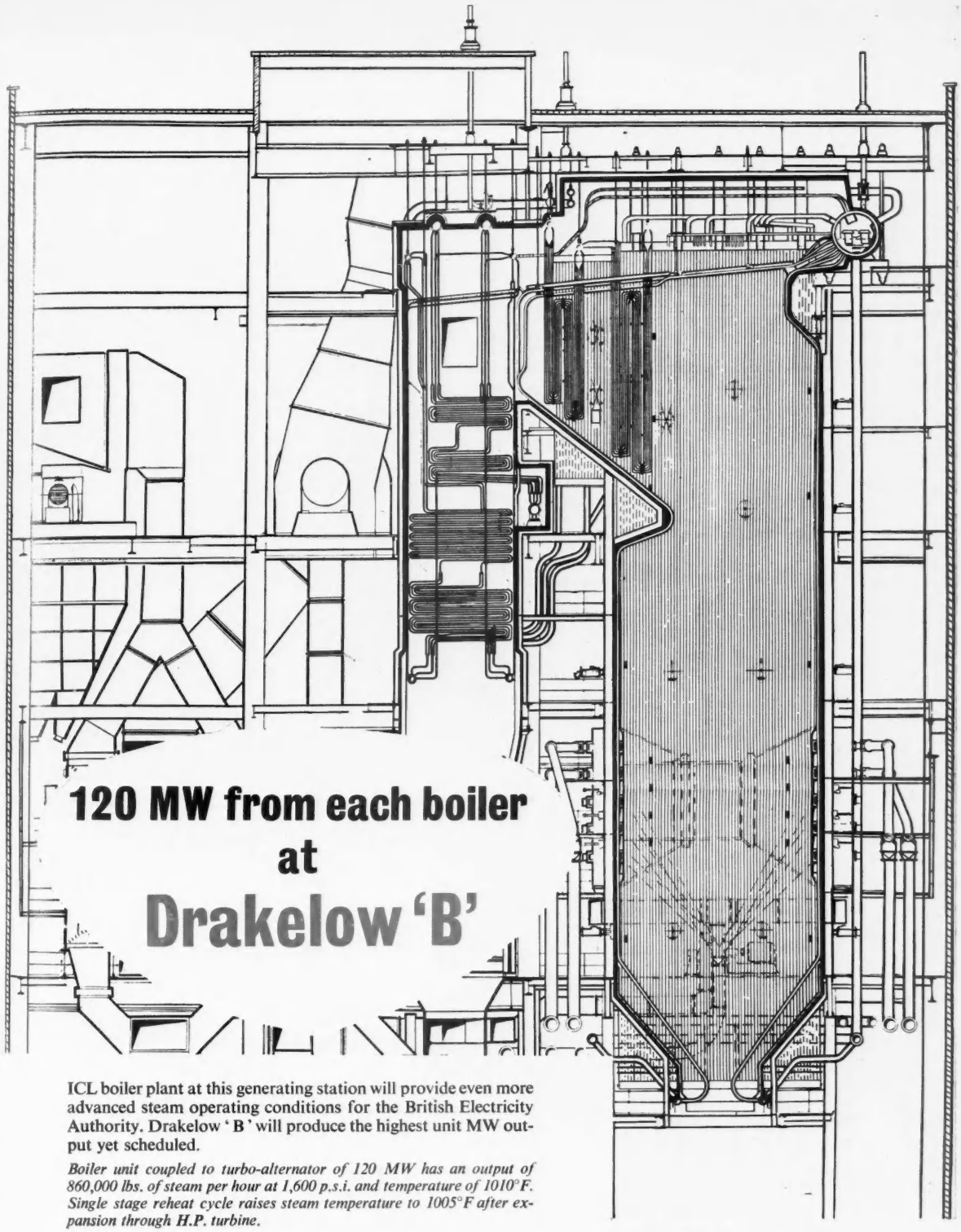

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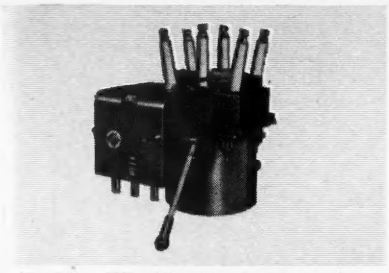
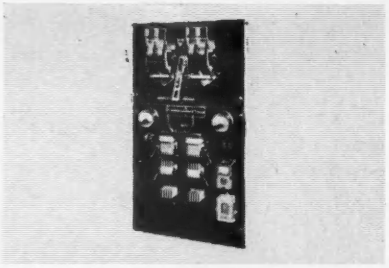
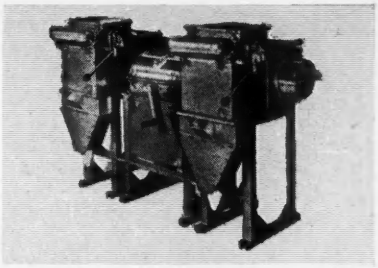


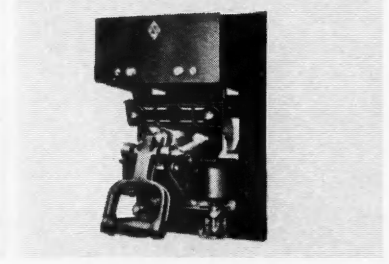
15 kV Oil Circuit Breaker for cubicle mounting



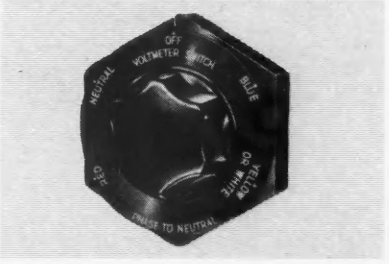
Heavy Current D.C. Circuit Breaker and Knife Switch Panel



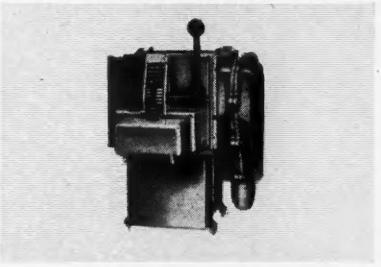
H.V. Ring Main Switchboard with Fuse Switch controlling Tee-Off



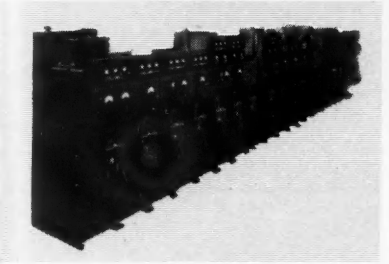
Small Air Circuit Breaker



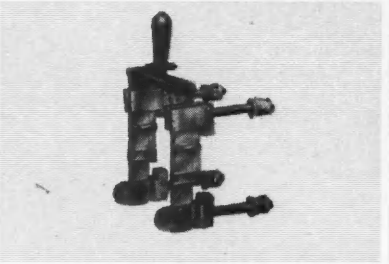
Ammeter and Voltmeter Switches



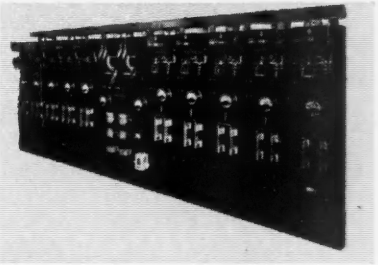
L.V. Industrial Oil Circuit Breaker



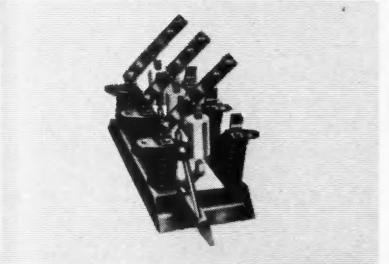
11 kV Metalclad Switchboard



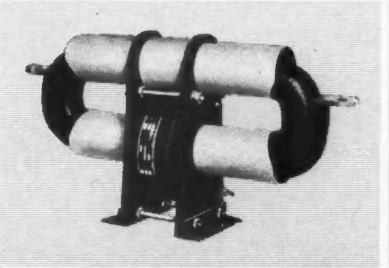
Panel Mounting Knife Switch



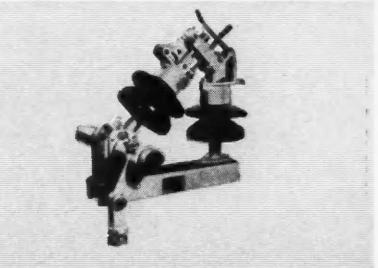
D.C. Switchboard for Steel Works



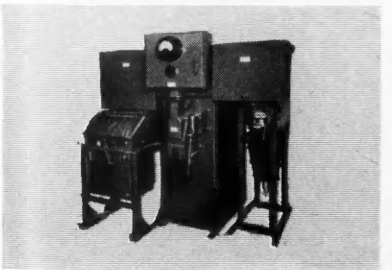
T.P. 11 kV Isolating Switch



Current Transformers



Outdoor Pole Mounting Isolators



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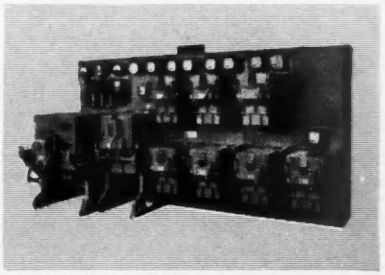

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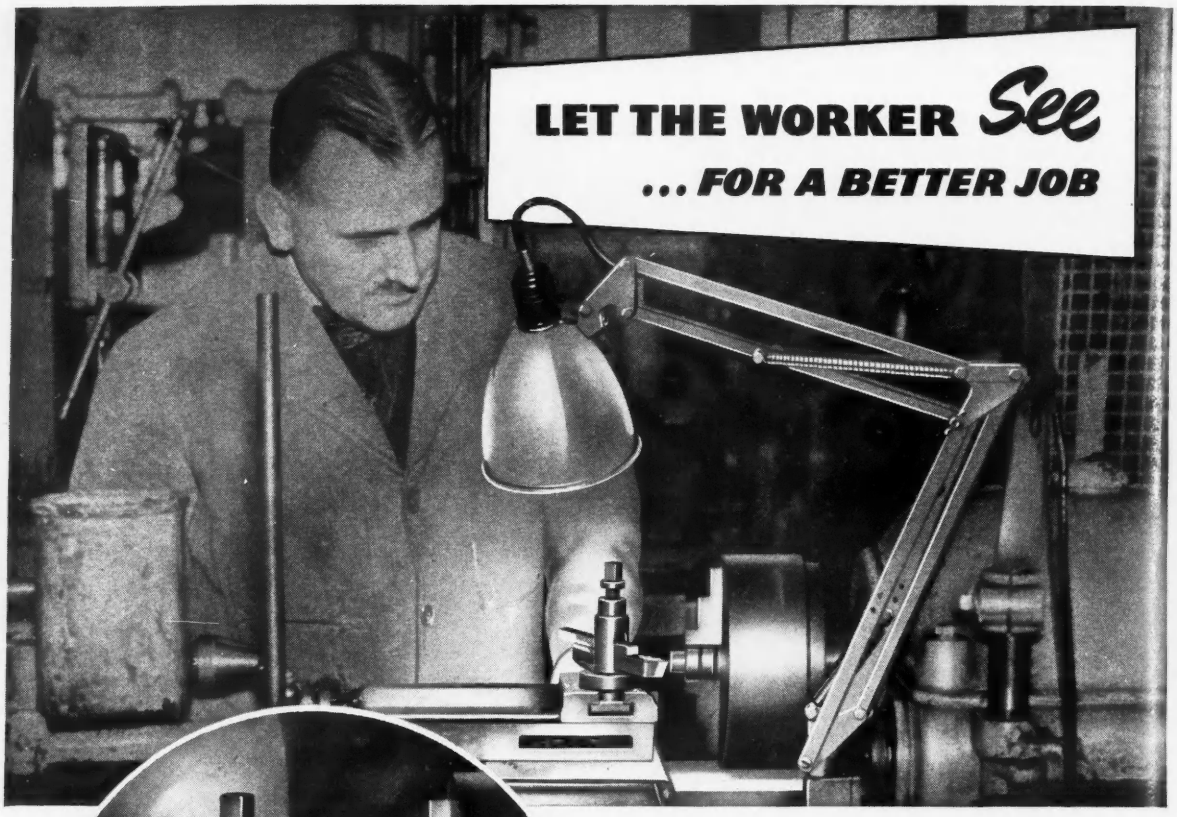

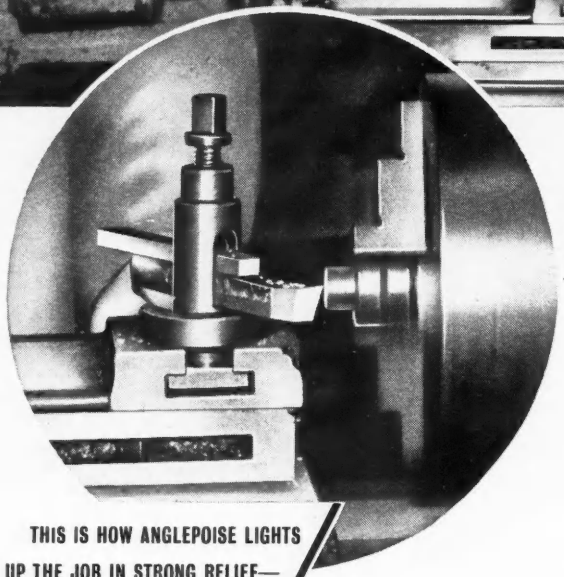

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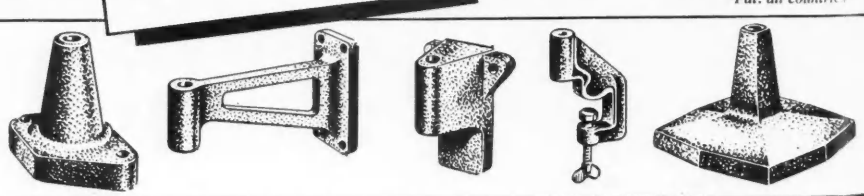

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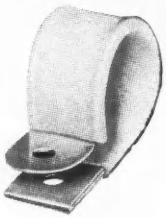

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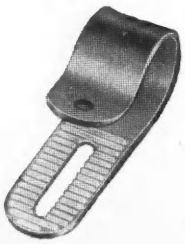

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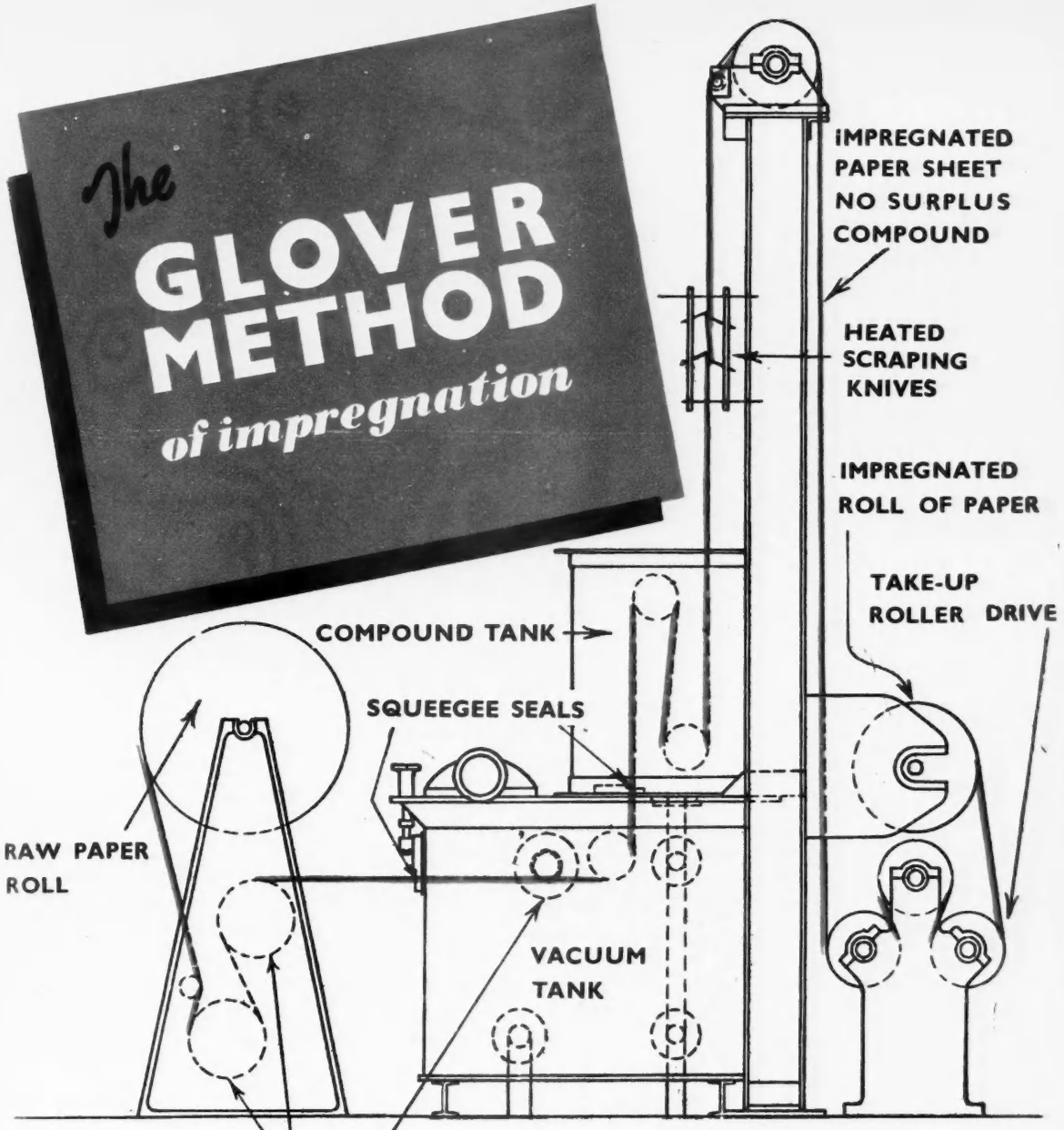

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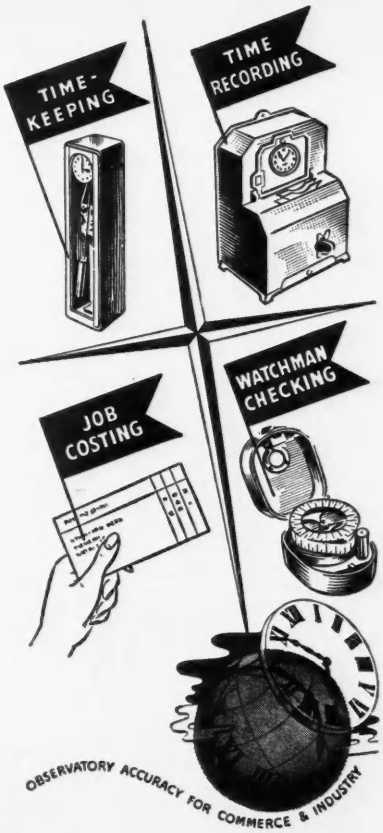

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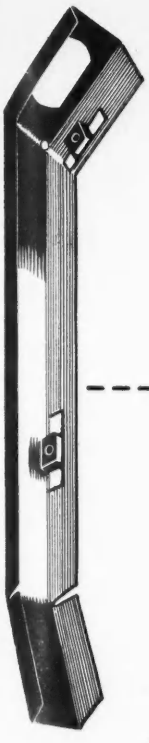

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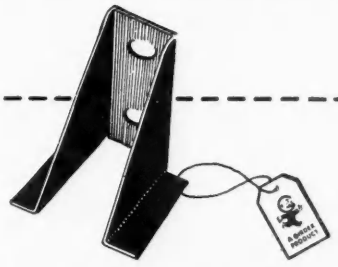

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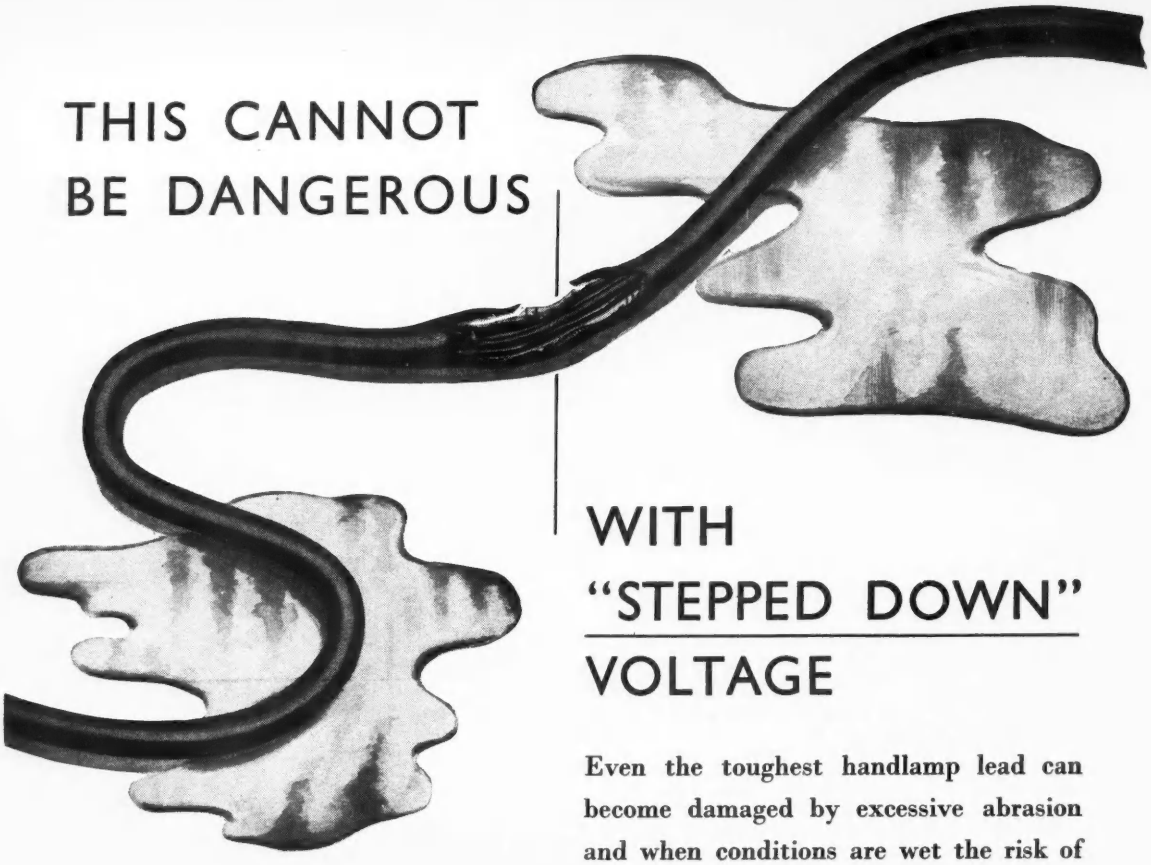

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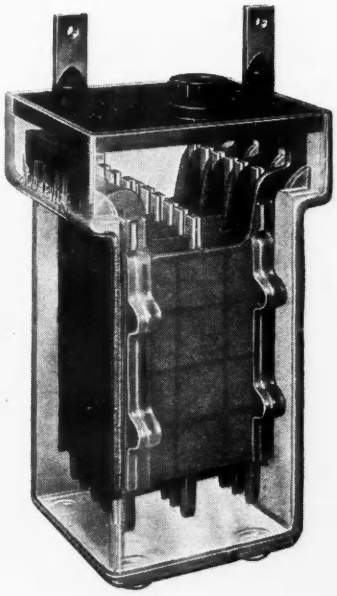

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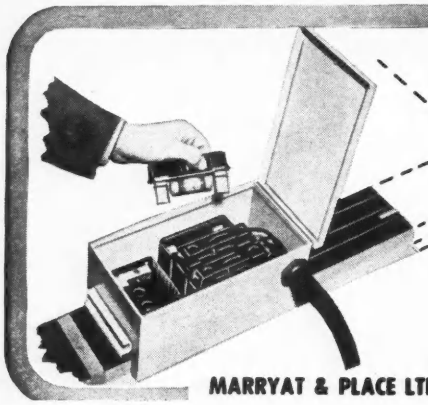

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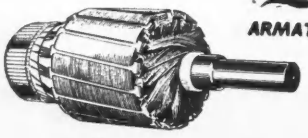

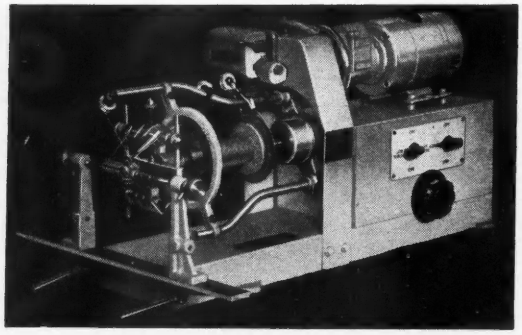

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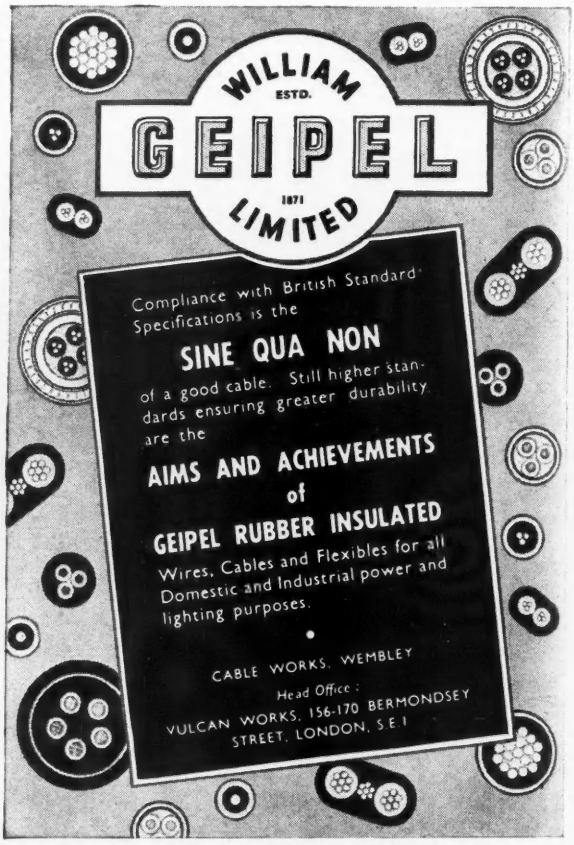

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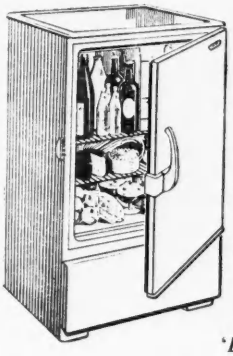

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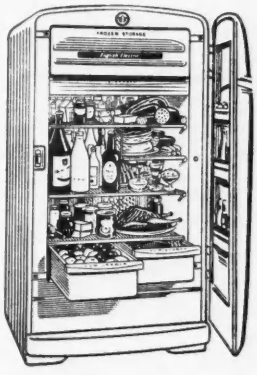


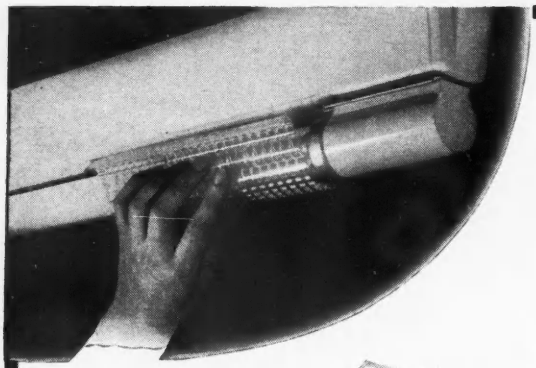
MODEL EA-83

The big refrigerator. Nearly 8½ cubic ft. storage space. Over 14½ sq. ft. shelf area. Full-width *freezer . . . lower-temperature Coldrawer . . . two Humidrawers. Hermetically-sealed 'ENGLISH ELECTRIC' refrigerating unit guaranteed for 5 years. Finish—white or cream enamel.*

'ENGLISH ELECTRIC'

BRINGING YOU BETTER LIVING

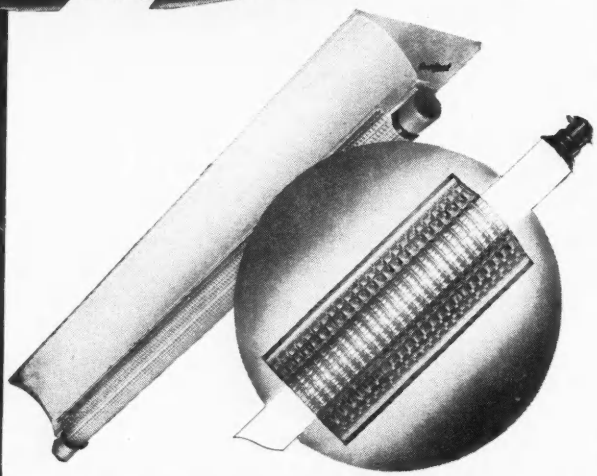
THE ENGLISH ELECTRIC COMPANY LIMITED, DOMESTIC APPLIANCE & TELEVISION DIVISION, LIVERPOOL, 10



Quick-Fix DIFFUSERS

REGD. DESIGN No. 869086 PATENT APPLIED FOR

They simply clamp on to the lamp



Quick-fix Diffusers eliminate glare and the discomfort of bare lamp lighting installations.

Quick-fix Diffusers are moulded from a crystal clear plastic material and their scientific design ensures the maximum transmission of well diffused light.

Quick-fix Diffusers are $3\frac{5}{8}$ inches wide by 8 inches long and lock together into continuous lines.

The number of Diffuser Units required for 5 ft., 4 ft. and 2 ft. lamps is 7, 6 and 3 respectively

LIST PRICE

5/- per unit *Plus Tax* $18\frac{3}{4}\%$

PLEASE WRITE FOR QUICK-FIX DIFFUSER AND FLUORESCENT FITTINGS BROCHURES

Quick-Fix BATTEN FOR ONE 80 W FLUORESCENT LAMP

Excellent Design • High Quality Finish • Competitive Price

FINISH : HARD GLOSSY WHITE STOVED ENAMEL **DIMENSIONS** : $64\frac{3}{4}$" LONG, $3\frac{5}{8}$" WIDE, $5\frac{1}{4}$" DEEP OVER LAMPHOLDER COVERS

DESCRIPTION	LAMPS	CAT. No	LIST PRICE
Quick-fix Batten Fitting	1-5 ft.—80 w.	1954	£2 4 0
Complete set Crossland (EDLAC) Tapped Control Gear 200/250 v.	—	1330	£3 6 0

ELFA ELECTRIC LIGHT FITTINGS ASSOCIATION

R. & A. G. CROSSLAND LTD.

Head Office and Works: CARTBRIDGE LANE • WALSALL • STAFFORDSHIRE • Walsall 6001/4

London Office: 55 EBURY STREET, LONDON, S.W.1. Sloane 7202/4 • **Manchester:** 10 MARSDEN STREET MANCHESTER 2. Blackfriars 8001 • **Bristol:** 80 SYLVAN WAY, SEAMILLS. Stoke Bishop 83123

Getting Coal with Night-lights!

WORK goes on throughout the night at the Open-Cast Coal Site, Ewart Hill, Bedlington, Northumberland. The operation is made speedy, easy and safe by the use of ten transportable lighting units, one of which is illustrated here. The cable used for this

exposed, all-weather duty

is 4-core pliable-armoured colliery-type trailing cable, supplied by:

ST. HELENS CABLE & RUBBER CO. LTD.
SLOUGH, BUCKS. Telephone: SLOUGH 20333

Photographs by courtesy of:
The National Coal Board
The Parkinson Strip Mining Co Ltd.
Messrs. F. H. Wheeler & Co. Ltd. Newcastle (Electrical Contractors)

Branches:
Bath, Belfast, Birmingham, Bradford, Cardiff, Glasgow, Lancaster, Liverpool, London, Manchester, Newcastle-on-Tyne, Portsmouth.

ST. HELENS CABLES

WHICHEVER TYPE YOU REQUIRE

CHOOSE PIRELLI GENERAL *cables*

AND ORDER FROM THE *G.E.C.*

THE GENERAL ELECTRIC CO. LTD · MAGNET HOUSE · KINGSWAY · LONDON · W.C.2

CLASSIFIED ADVERTISEMENTS

ADVERTISEMENTS are accepted up to **First Post on Monday** of the week of issue, and should be addressed to Classified Advertisement Department, Dorset House, Stamford Street, London, S.E.1.

CLASSIFIED advertisements are PREPAID at 3/- per line (approx. 6 words) per insertion. Where an advertisement includes a Box Number this counts as two words and carries an additional charge of 1/-.

DISPLAYED:—£2 per inch, per insertion. Cheques and Postal Orders should be crossed and made payable to ELECTRICAL REVIEW PUBLICATIONS LTD.

SITUATIONS WANTED:—Three insertions under this heading can be obtained for the price of two if ordered and prepaid with the first insertion.

REPLIES to Box Numbers should be addressed to the Box Number in the advertisement, c/o ELECTRICAL REVIEW, Dorset House, Stamford Street, London, S.E.1, but if not to be delivered to any particular firm or individual they should be accompanied by instructions to this effect, addressed to the Manager of the ELECTRICAL REVIEW. Replies in such cases cannot be returned. The name of an advertiser using a Box Number will not be disclosed.

Original testimonials should not be sent with applications for employment

OFFICIAL NOTICES, TENDERS, ETC.

BOROUGH OF STAMFORD

Electrical Installation and Wiring in Pre-War Council Houses

TENDERS are invited for the installation, and wiring and putting into service of electric lighting and heating points in pre-war Council houses and bungalows, being in some houses for the complete installation and in others for additions to the existing installation.

Tenders may be for works in any or all of the following groups:—

Group A: 71 Houses, 16 Bungalows.
Group B: 126 Houses, 8 Bungalows.
Group C: 142 Houses.
Group D: 113 Houses.
Group E: 87 Houses.
Group F: 30 Houses.

General conditions, specification, bills of quantities, schedules of houses and installations in each group, and form of tender, may be obtained from the Borough Engineer and Surveyor, Town Hall, Stamford, on payment of a deposit of two guineas, which will be returned on receipt of a bona fide tender not subsequently withdrawn.

Tenders, in plain sealed envelopes endorsed "Council House Lighting," and without any mark or name indicating the sender, should be addressed to the undersigned to arrive not later than noon on the 4th September, 1954.

The Council does not bind itself to accept the lowest or any tender.

H. G. WHEWAY,
Town Clerk.

Town Hall,
Stamford, Lincs.
29th July, 1954. 4420

MIDLOTHIAN COUNTY COUNCIL

TENDERS are invited for the supply and erection of 114 140-watt Sodium Lamps, mounted on 25-ft. reinforced concrete street lighting columns, to be erected on routes A.70 (Edinburgh-Lanark road) and C.29 (Balerno-Harelaw road) between Edinburgh City Boundary and Balerno Bus Station.

Specifications, bills of quantities and form of tender may be obtained from, and a copy of the plan seen at the office of, the County Surveyor, 32, Palmerston Place, Edinburgh, 12.

Sealed offers, marked "Street Lighting, Currie and Balerno," should be lodged with the undersigned before 10 a.m. on Saturday, 28th August, 1954.

The County Council do not bind themselves to accept the lowest or any offer.

JAMES McBOYLE,
County Clerk.

County Buildings,
George IV Bridge,
Edinburgh, 1. 4473

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

Northern Area

Strathoykell Distribution

TENDERS are invited for the construction of 11-kV and low-voltage wood pole lines in the Strathoykell District of the County of Sutherland.

Copies of the tender document may be obtained on application to the undersigned on payment of a deposit of two guineas (returnable).

The Board do not bind themselves to accept the lowest or any tender.

R. B. ANDERSON, M.I.E.E.,
Area Manager.

Church Street,
Dingwall, Ross-shire. 4472

ELECTRICITY (ESSENTIAL SUPPLIES) ACT (NORTHERN IRELAND) 1954

CITY & COUNTY BOROUGH OF BELFAST

Electricity Department

TENDERS are re-invited for the supply, delivery and erection at Belfast Municipal Electric Power Station West of Portable Fire-Fighting Appliances. The installation is required to be complete by 31st October, 1954.

Form of tender (N.1519), conditions, specification and drawings, in quintuplicate, may be obtained from Messrs. Merz & McLellan, Consulting Engineers, Carliol House, Newcastle upon Tyne, 1, on payment of a deposit of five guineas, which will be refunded provided a bona fide tender is lodged and not withdrawn. Extra copies of the contract document may be obtained at one guinea each; this sum will not be returnable. Cheques should be made payable to the Belfast Corporation Electricity Department.

Each tender, in quadruplicate, in sealed envelope marked "Tender for Portable Fire-Fighting Appliances, Electricity Department," and endorsed with the name and address of the tenderer, must be addressed to the Town Clerk, City Hall, Belfast, so as to reach him not later than 4 p.m. on Thursday, 26th August, 1954.

An official receipt must be obtained for each tender delivered by hand. Tenders sent by post should be registered.

The lowest or any tender will not necessarily be accepted.

EYRE GORDON,
Chairman,
Northern Ireland Joint Electricity Committee.

Chichester House,
Chichester Street, Belfast.
30th August, 1954. 4489

FARNBOROUGH URBAN DISTRICT COUNCIL

Engineer and Surveyor's Department

Supply of Street Lighting Equipment

TENDERS are invited for the supply of Street Lighting Columns, Lanterns, Chokes, Capacitors, Time Switches, etc., for approximately 86 lamps.

Copies of the form of tender, specification and bill of quantities can be obtained from the Engineer and Surveyor, Town Hall, Farnborough, Hants, and must be returned to the undersigned, sealed and endorsed "Street Lighting Equipment," not later than Friday, 28th August, 1954.

The Council do not bind themselves to accept the lowest or any tender.

D. STUART JONES,
Clerk of the Council.

Town Hall,
Farnborough, Hants.
31st July, 1954. 4463

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

Invergarry-Fort William Transmission

33-kV Switchgear for Fort William Substation

TENDERS are invited for the provision of outdoor 33-kV switchgear and ancillary equipment for the above-mentioned substation. Copies of the tender document may be obtained on application, with a cheque for £2 2s. (returnable), to the Engineers, Messrs. Kennedy & Donkin, 12, Caxton St., London, S.W.1.

The Board do not bind themselves to accept the lowest or any tender.

W. D. D. FENTON,
Secretary.

16, Rothesay Terrace,
Edinburgh, 3. 4509

URBAN DISTRICT OF ELLESMERE PORT

Contract No. 164

Conversion of Street Lamps from Gas to Electricity

THE Council invite tenders for Equipment, Materials and Labour required in the conversion of 165 Street Lamps from Gas to Electricity.

The drawings may be seen by appointment, and a set of tender documents, comprising the Institution of Electrical Engineers recommended conditions of contract, specification, bills of quantities and form of tender, may be obtained at the offices of the Council's Engineer and Surveyor, Queen Street, Ellesmere Port, on payment of a deposit of two guineas, which deposit will be refunded on the return of the contract documents, or, in the case of a bona fide tender which is accepted and not subsequently withdrawn, on completion of the formal contract between the Council and the successful tenderer.

Sealed tenders in the plain official envelope provided, together with contract documents, must reach the undersigned by not later than 5 p.m. on Tuesday, 31st August, 1954. Tenders received after this date and time will not be considered by the Council.

The Council do not bind themselves to accept the lowest or any tender.

P. J. HODGES,
Clerk of the Council.

Council Offices,
Ellesmere Port, Cheshire.
3rd August, 1954. 4488

BOROUGH OF HEYWOOD

Supply of Class B Street Lighting Materials

TENDERS are invited for the supply of the whole or part of the following:—

90 Control Boxes to fit 3" Male Spigot.
90 5' 6" 1-inch Gas Swan Necks.
210 Enclosed Type Lanterns.
210 Synchronous Electric Controllers.
120 Concrete Columns, Narrow Base.

Further particulars can be obtained from the Lighting Superintendent, Market Hall, Hind Hill Street, Heywood.

Tenders in plain sealed envelopes, endorsed "Street Lighting Materials," must be delivered to the undersigned not later than Monday, 30th August, 1954.

The Corporation do not bind themselves to accept the lowest or any tender.

W. R. PARKER,
Town Clerk.

Municipal Buildings,
Heywood, Lancs.
4th August, 1954. 4462

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

Glascarnoch-Luichart-Torr Achilty Project

Electric Lighting, Heating & Auxiliary Cabling Installation for Torr Achilty Power Station and Dam

TENDERS are invited for the above installation. Copies of the tender document may be obtained on application, with a cheque for £2 2s. (returnable), to the Engineers, Messrs. Merz & McLellan, 72a, George Street, Edinburgh, 2.

The Board do not bind themselves to accept the lowest or any tender.

W. D. D. FENTON,
Secretary.

16, Rothesay Terrace,
Edinburgh, 3.
29th July, 1954. 4491

URBAN DISTRICT OF ELLESMERE PORT

Contract No. 167

Public Lighting Installation, Station Road and Rossmore Road (A.5032), Little Sutton

TENDERS are invited for the provision and erection of 19 Sodium Discharge Lamps.

The drawings may be seen by appointment, and a set of tender documents, comprising the Institution of Electrical Engineers recommended conditions of contract, specification, bills of quantities and form of tender, may be obtained at the offices of the Council's Engineer and Surveyor, Queen Street, Ellesmere Port, on payment of a deposit of two guineas, which deposit will be refunded on the return of the contract documents, or, in the case of a bona fide tender which is accepted and not subsequently withdrawn, on completion of the formal contract between the Council and the successful tenderer.

Sealed tenders in the plain official envelope provided, together with contract documents, must reach the undersigned by not later than 5 p.m. on Tuesday, 31st August, 1954. Tenders received after this date and time will not be considered by the Council.

The Council do not bind themselves to accept the lowest or any tender.

P. J. HODGES,
Clerk of the Council.

Council Offices,
Ellesmere Port, Cheshire.
3rd August, 1954. 4487

URBAN DISTRICT COUNCIL OF WELLINGBOROUGH

Group A Street Lighting

TENDERS are invited from specialist contractors for the supply and erection within the Urban District of 95 three 80-watt tube Fluorescent Lanterns mounted on 25′ columns.

Plans and general conditions of contract may be inspected at the office of the Engineer and Surveyor, Council Offices, Swanspool, Wellingborough, from whom form of tender, specification and bill of quantities may be obtained upon payment of a deposit of £2 2s., which will be returned following the receipt of a bona fide tender. The tender, together with a specification and detailed drawing of each type of column and lantern, is to be submitted in the envelope provided.

Tenders must be received by me not later than noon on Monday, 6th September, 1954.

W. G. PALMER,
Clerk of the Council.

Council Offices,
Swanspool,
Wellingborough.
30th July, 1954. 4492

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

Lawers Project

Electric Lighting, Heating and Plug Points and Auxiliary Cabling for Finlarig Power Station, Dam and Portal Valve House

TENDERS are invited for the above installation. Copies of the tender document may be obtained on application, with a cheque for £2 2s. (returnable), to the Engineers, Messrs. Merz & McLellan, 72a, George Street, Edinburgh, 2.

The Board do not bind themselves to accept the lowest or any tender.

W. D. D. FENTON,
Secretary.

16, Rothesay Terrace,
Edinburgh, 3.
4th August, 1954. 4510

COUNTY BOROUGH OF NORTHAMPTON

CONTRACTORS wishing to tender for the final stage of the New Electrical Services in the Guildhall should apply to the Borough Architect, Guildhall, Northampton, before 20th August, enclosing crossed cheque (payable to "Northampton Corporation") for £2 2s. This sum will be returned if a bona fide tender is received by the time stated on the form of tender.

C. E. VIVIAN ROWE,
Town Clerk. 4434

ELECTRICITY (ESSENTIAL SUPPLIES) ACT (NORTHERN IRELAND) 1954

CITY AND COUNTY BOROUGH OF BELFAST

Electricity Department

TENDERS are invited for the supply, delivery and erection at Belfast Municipal Electric Power Station West of Metering Equipment to form an extension to an existing installation supplied by Landis & Gyr Ltd. The first section of the extension is required to be complete by August, 1955.

Form of tender (N.1577), conditions, specification and drawings, in quintuplicate, may be obtained from Messrs. Merz & McLellan, Consulting Engineers, Carliol House, Newcastle upon Tyne, 1, on payment of a deposit of five guineas, which will be refunded provided a bona fide tender is lodged and not withdrawn. Extra copies of the contract document may be obtained at one guinea each; this sum will not be returnable. Cheques should be made payable to the Belfast Corporation Electricity Department.

Each tender, in quadruplicate, in sealed envelope marked "Tender for Metering Equipment, Electricity Department," and endorsed with the name and address of the tenderer, must be addressed to the Town Clerk, City Hall, Belfast, so as to reach him not later than 4 p.m. on Thursday, 16th September, 1954.

An official receipt must be obtained for each tender delivered by hand. Tenders sent by post should be registered.

The lowest or any tender will not necessarily be accepted.

EYRE GORDON,
Chairman,
Northern Ireland Joint Electricity Committee.

Chichester House,
Chichester St., Belfast.
6th August, 1954. 4515

ASHBOURNE URBAN DISTRICT COUNCIL

Public Lighting Scheme, Stage III

THE Council invite tenders from experienced firms for the supply and erection of the following approximate number of Street Lamps:

No. 145—150-w. Tungsten Lamps, complete with standards.

Plans may be seen and general conditions of contract, specification and requirements of the contract may be obtained from the office of the Engineer and Surveyor, King Edward Street, Ashbourne, Derbyshire, upon receipt of a deposit of £1 1s., which will be returned on receipt of a bona fide tender not subsequently withdrawn.

Tenders with all documents should be enclosed in plain sealed envelopes endorsed "Tender for Street Lighting, Stage 3," and should reach the office of the undersigned not later than Tuesday, 31st August, 1954.

The Council do not bind themselves to accept the lowest or any tender.

F. HUGH THOMAS,
Clerk to the Council.

Compton Offices,
Ashbourne, Derbyshire.
29th July, 1954. 4490

URBAN DISTRICT COUNCIL OF KEYNSHAM

Housing: Supply of Immersion Heaters

TENDERS are invited for the supply and/or supply and fixing of Immersion Heaters to 246 Houses on the Park West Estate, Keynsham. Form of tender, specification and details of fixing arrangements may be obtained upon application to the Surveyor and Engineer, Council Offices, Keynsham, Bristol, on payment of a deposit of £2 2s., which will be refunded on receipt of a bona fide tender not subsequently withdrawn and the return of all documents.

Tenders in plain sealed envelopes endorsed "Immersion Heaters" must reach the undersigned not later than first post on Tuesday, 31st August, 1954.

The Council do not bind themselves to accept the lowest or any tender.

GEO. R. ASHTON,
Clerk of the Council.

Council Offices,
Keynsham, Bristol.
14th August, 1954. 4513

BOROUGH OF SOLIHULL

Street Lighting, Stratford Rd., Shirley

TENDERS are invited for the provision and installation on trunk road A.34 (Stratford Road, Shirley) of 64 Street Lighting Units, including 25-ft. steel columns, 140-watt sodium lamps, lanterns and auxiliary gear.

Specifications, bills of quantities, forms of tender, etc., may be obtained from, and drawings and general conditions of contract inspected at, the office of the Borough Engineer, 90, Station Road, Solihull, on deposit of a fee of two guineas, returnable on receipt of a bona fide tender not subsequently withdrawn.

Tenders, sealed in the official envelopes provided, must be returned to the undersigned not later than noon on Friday, 27th August.

The Council do not undertake to accept the lowest or any tender.

W. MAURICE MELL,
Town Clerk.

Council House,
Solihull.
7th August, 1954. 4509

CITY OF ST. ALBANS

Electrical Installations to Pre-War Houses

TENDERS are invited from Electrical Engineers for lighting and general purpose Electrical Installations to some 100 pre-war Council houses.

Form of tender, conditions of contract, specification and schedule obtainable from the City Engineer and Surveyor's Office, 16, St. Peter's Street, St. Albans, on payment of a deposit of 2 guineas (refundable on receipt of a bona fide tender not subsequently withdrawn).

Tenders in the envelope provided must reach me by 12 noon, Tuesday, 7th September, 1954.

W. B. MURGATROYD,
Town Clerk.

38, St. Peter's Street,
St. Albans. 4514

BOROUGH OF NUNEATON

Class A and B Street Lighting

TENDERS, to be received not later than Friday, 27th August, 1954, are invited for the erection and putting into service of 149 140-watt Sodium Discharge and 20 80-watt Fluorescent Mercury Street Lamps, and the erection only of 11 3 × 80-watt Fluorescent Street Lamps.

Particulars are obtainable from the Borough Surveyor, Council House, Nuneaton, on payment of a deposit of two guineas. 4493

SITUATIONS VACANT

The engagement of person sanswering these advertisements must be made through the Local office of the Ministry of Labour and National Service, etc., if the applicant is a man aged 18-64 or a woman aged 18-59 inclusive, unless he or she or the employer is excepted from the provisions of The Notification of Vacancies Order, 1952.

EASTERN ELECTRICITY BOARD

Essex Sub-Area

Third Assistant Engineer, North Essex District

(109/54.R.)

CANDIDATES should have had a sound training in electrical engineering and experience in the construction, operation and maintenance of overhead and underground distribution systems, including substations. Experience in rural planning work would be an advantage.

Salary will be in accordance with Class E, Grade 9, of the National Joint Board Salary Agreement, commencing at £587, and future salary and conditions of service will be in accordance with agreements made from time to time by the appropriate negotiating bodies.

The successful candidate will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Applications by letter stating age, education, qualifications and experience with details of present appointment and salary, should be submitted to the District Manager, North Essex, Eastern Electricity Board, Cressing Road, Braintree, Essex, within fourteen days of the appearance of this advertisement. 4522

YORKSHIRE ELECTRICITY BOARD

No. 6 (Hull) Sub-Area

THIRD ASSISTANT ENGINEER (RURAL DEVELOPMENT). Applicants should have had experience in the construction, operation and maintenance of overhead lines in a rural area, and should hold the Higher National Certificate in Electrical Engineering or equivalent qualifications.

The successful candidate will be required to reside in Driffield and carry out standby duties.

Salary N.J.B. Class K, Grade 10, £719/£750 per annum.

BRIDLINGTON DISTRICT.

THIRD ASSISTANT DISTRICT ENGINEER (DRIFFIELD). Applicants should have had a good general and technical education, with practical training, preferably in the electricity supply industry, and should hold the Higher National Certificate in Electrical Engineering or equivalent qualifications. They should have experience in the construction of overhead lines and experience in operation and maintenance will be an advantage.

The successful candidate will be required to reside in the district and may be required to undertake standby duty.

Salary N.J.B. Class D, Grade 9, £561/£578 per annum.

GENERAL ASSISTANT DISTRICT ENGINEER (DRIFFIELD). Applicants should hold the Higher National Certificate in Electrical Engineering or equivalent qualifications, and have had experience in the construction, operation and maintenance of E.H.T. and L.T. overhead and underground distribution systems in a mixed urban and rural district.

The successful candidate will be required to reside in the district and may be required to undertake standby duty.

Salary N.J.B. Class D, Grade II, £500/£516 per annum.

GOOLE DISTRICT.

GENERAL ASSISTANT DISTRICT ENGINEER (POCKLINGTON). Applicants should hold the Higher National Certificate in Electrical Engineering or equivalent qualifications, and have had experience in the construction, operation and maintenance of E.H.T. and L.T. overhead and underground distribution systems in a rural district.

The successful candidate will be required to reside in the district and may be required to undertake standby duty.

Salary N.J.B. Class E, Grade II, £524/£540 per annum.

HULL, BRIDLINGTON AND GOOLE DISTRICTS.

JUNIOR ENGINEERS. Applicants should hold the Higher National Certificate in Electrical Engineering or equivalent qualifications, and have had training in construction, operation and maintenance of H.V. and L.V. overhead and underground distribution systems.

The successful applicants will be required to reside in the district to which they are appointed.

HULL DISTRICT: Hull (1 post), Hornsea (1 post). Salary N.J.B. Class J, Grades 18/14, £402/£545 per annum.

BRIDLINGTON DISTRICT: Driffield (1 post). Salary N.J.B. Class D, Grades 15/14, £390/£423 per annum.

GOOLE DISTRICT: Goole (1 post). Salary N.J.B. Class E, Grades 15/14, £390/£445 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 6 (Hull) Sub-Area, Yorkshire Electricity Board, Ferensway, Kingston-upon-Hull, not later than 26th August, 1954.

4498

BRITISH ELECTRICITY AUTHORITY

North West, Merseyside and North Wales Division

VACANCY No. 140/54: STATION SHIFT CONTROL ENGINEER, Roosecote Generating Station, Barrow-in-Furness. Salary £608/£630 (G.10).

Apply, quoting vacancy number, to Controller, British Electricity House, 825, Wilmslow Road, Manchester, 20, before 21st August, 1954. 4495

SOUTH WEST SCOTLAND ELECTRICITY BOARD

Lanarkshire Sub-Area

(1) APPOINTMENT OF THIRD ASSISTANT DISTRICT ENGINEER, UDDINGSTON DISTRICT.

(2) APPOINTMENT OF THIRD ASSISTANT DISTRICT ENGINEER, MOTHERWELL DISTRICT.

(3) APPOINTMENT OF GENERAL ASSISTANT ENGINEER, SUB-AREA PLANNING & DEVELOPMENT DEPT.

(4) APPOINTMENT OF GENERAL ASSISTANT ENGINEER, SUB-AREA OPERATION & MAINTENANCE DEPT.

APPLICATIONS are invited for the above appointments. Candidates should preferably be Graduates of the Institution of Electrical Engineers or hold equivalent qualifications.

The salary and conditions of service for each appointment will be in accordance with the National Joint Board's Agreement, Schedule A. The present classification and grading for each appointment is stated below.

The successful candidates for appointments Nos. 1 and 2 will require to reside within a reasonable distance of the respective District offices, and for appointments Nos. 3 and 4 within a reasonable distance of the Sub-Area offices at Hamilton.

(1) 3RD ASSISTANT DISTRICT ENGINEER, UDDINGSTON DISTRICT.

(2) 3RD ASSISTANT DISTRICT ENGINEER, MOTHERWELL DISTRICT.

Applicants for these two appointments should have had a sound engineering training with subsequent experience in the operation and maintenance of H.V. and L.V. switchgear and of overhead and underground distribution systems.

The present classification and grading for these appointments is F.9, salary £607/£629 per annum, which will be subject to the statutory deductions, including superannuation.

(3) GENERAL ASSISTANT ENGINEER (SUB-AREA PLANNING AND DEVELOPMENT DEPARTMENT).

Applicants for this appointment should have had a sound engineering training, also a knowledge of short circuit calculations, load flow diagrams and voltage drop calculations, together with some experience in the design and layout of H.V. and L.V. underground and overhead distribution systems.

The present classification and grading for this appointment is K.13, salary £583/£605 per annum, which will be subject to the statutory deductions, including superannuation.

(4) GENERAL ASSISTANT ENGINEER (SUB-AREA OPERATION & MAINTENANCE DEPARTMENT).

Applicants for this appointment should have had a sound engineering training, also a knowledge of short circuit calculations, load flow diagrams and voltage drop calculations, together with some experience in the operation and maintenance of H.V. and L.V. distribution systems.

The present classification and grading for this appointment is K.13, salary £583/£605 per annum, which will be subject to the statutory deductions, including superannuation.

Application forms for the above appointments, which may be obtained from the undersigned, should be returned to this office within 14 days of the date of this notice.

DUGALD SMITH,
Manager.

137, Almada Street,
Hamilton. 4477

BRITISH ELECTRICITY AUTHORITY

South Wales Division

Vacancy No. 80/54

APPLICATIONS invited for superannuable N.J.B. appointment of STATION SHIFT CONTROL ENGINEER at Tir John Power Station. Salary Class H.10, £641-£667 per annum.

H.N.C. and experience in power station control room desirable.

Application forms obtainable from Secretary, South Wales Division, British Electricity Authority, Twyn-y-fedwen Rd., Gabalfa, Cardiff, to be returned by 23rd August, 1954. 4436

SOUTH EASTERN ELECTRICITY BOARD

FIRST ASSISTANT DISTRICT COMMERCIAL ENGINEER, WOKING DISTRICT. Salary £699-£725 p.a. under N.J.B. Class E, Grade 6. Superannuable.

Applicants must be suitably qualified electrical engineers with experience in sales and all aspects of service to domestic and industrial consumers. A knowledge of voltage change-over procedure would be an advantage.

Applications on forms from J. C. Poole, A.M.I.E.E., Woking Manager, SEEBoard, 4, Chobham Road, Woking, by 25th August, 1954.

GENERAL ASSISTANT DISTRICT ENGINEER, SEVENOAKS DISTRICT. Salary £433 p.a. under N.J.B. Class E, Grade 14. Superannuable.

Applicants should have had a good general education and technical training up to Higher National Certificate standard or equivalent. Experience of underground and overhead distribution systems is essential.

Applications, naming 2 referees, to H. F. Gill, District Manager, SEEBoard, Electric House, West Hill, Oxted, Surrey, by 25th August, 1954.

SENIOR SHOWROOM ASSISTANT (MALE), SUTTON DISTRICT. Salary £485 × £20 to £545 p.a. plus London weighting under N.J.C. Grade 2. Superannuable.

Applicants should have a good knowledge of electrical appliances and be capable of advising consumers on tariffs and supply matters. The successful applicant will be required to take charge of a new showroom in Banstead and may also be required to undertake duties in any other showroom within the Sutton district.

Applications on forms from C. W. Emanuel, M.I.E.E., Sutton Manager, SEEBoard, 52/54, High Street, Sutton, Surrey to be returned, naming 2 referees by 25th August, 1954.

SENIOR SHOWROOM ASSISTANT (MALE), WOKING DISTRICT. Salary within the range of £400 × £20 to £480 × £10 to £490 p.a. under N.J.C. Grade 1. Superannuable.

The successful applicant will be required primarily to take charge of the new Addlestone showroom but may be required to work in any of the Woking district showrooms. Applicants should have ability to promote sales and be experienced in general showroom duties, including advice to consumers on choice of appliances, tariffs and consumers' service.

Applications, naming 2 referees, on forms from J. C. Poole, A.M.I.E.E., Woking Manager, SEEBoard, 4, Chobham Road, Woking, to be returned by 25th August, 1954.

A. L. BURNELL,
Secretary.

4525

BRITISH ELECTRICITY AUTHORITY

North West, Merseyside and North Wales Division

APPLICATIONS are invited for the appointment of SHIFT CHARGE ENGINEER at the Bromborough Power Station, Cheshire. Salary £772/£802 per annum, Class H, Grade 7, N.J.B. Superannuable and subject to medical examination.

Applicants should preferably be Associate Members of the Institution of Electrical or Mechanical Engineers or possess equivalent technical qualifications, have had a good general and technical education, and be experienced in the shift operation of a modern power station.

Application forms may be obtained from the Divisional Controller, Beaconsfield Road, Woolton, Liverpool. Closing date 25th August, 1954. 4476

MIDLANDS ELECTRICITY BOARD

THIRD ASSISTANT ENGINEER required at Central Gloucestershire Sub-Area Headquarters. Experience necessary in the design, construction and maintenance of primary substations up to 66 kV. Operational experience and technical qualifications desirable. Salary £641/£667 (N.J.B. Class H, Grade 10). Superannuable.

Apply in writing within 14 days, stating age, experience, salary and position to D. Holt, Sub-Area Manager, Midlands Electricity Board, 126, London Road, Gloucester.

A. STEPHENS,
Secretary. 4547

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the following positions within the Division:—

POWER STATION SUPERINTENDENT, DERBY (Vacancy No. 116/54/ER). Applications are invited from suitably qualified engineers for the position of Station Superintendent at the Derby Generating Station. Candidates for this position should have had considerable experience in the operation and management of a modern generating station and should also have had experience of pulverised fuel firing.

The salary will be in accordance with the National Joint Managerial and Higher Executives Grades Agreement, Scale 1 (£1,150-£1,300 per annum).

Closing date for receipt of applications 18th August, 1954.

THIRD ASSISTANT ENGINEER, TRANSMISSION CONSTRUCTION DEPT. (OVERHEAD LINES), DIVISIONAL HEADQUARTERS (Vacancy No. 121/54/ER). Preference will be given to applicants who are Corporate Members of either the Institution of Civil, Electrical or Mechanical Engineers, or who hold equivalent qualifications and have had experience in construction of E.H.T. transmission lines in the field from initial profile to final sag checking.

The salary will be within Schedule C, Class AX/DX, Grade 5 (£649-£858 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications 26th August, 1954.

These appointments will be pensionable within the terms and provisions of the British Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT which may be obtained from the Divisional Establishments Officer, British Electricity Authority, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. Please quote vacancy number.

L. F. JEFFREY,
Divisional Controller. 4518

LONDON ELECTRICITY BOARD

Senior Development Assistant

APPLICATIONS are invited for the above position in the St. Pancras District of the North Western Sub-Area.

Applicants are required to have a sound knowledge of all aspects of service to consumers and be capable of planning and estimating for domestic, commercial and small industrial installations. They should possess a good knowledge of electrical apparatus and the basic principles of tariffs and their application.

The post is graded within the National Joint Council Agreement (Administrative and Clerical Grades) as Grade 2, i.e., £485 to £545 per annum, plus the appropriate London Area allowance.

Application forms obtainable from Personnel Officer, 46, New Broad Street, London, E.C.2, to be returned within 10 days of the publication date of this advertisement. Please enclose addressed envelope and quote ref. V/1775/R on envelope and all correspondence. 4474

UNIVERSITY OF SYDNEY, AUSTRALIA

APPLICATIONS are invited for the position of LECTURER IN ELECTRICAL ENGINEERING. Applicants should have had experience in the field of interconnected power systems.

The salary for a Lecturer is within the range of £A.1,100-£A.1,450 per annum, with annual increments of £A.50. The salary is subject to deductions under the State Superannuation Act. The commencing salary will be fixed according to the qualifications and experience of the successful applicant.

Finance available for home purchase under Staff Members' Housing Scheme.

Further particulars and information as to the method of application may be obtained from the Secretary, Association of Universities of the British Commonwealth, 5, Gordon Square, London, W.C.1.

The closing date for the receipt of applications, in Australia and London, is 28th August, 1954. 4465

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable posts. Conditions of service in accordance with N.J.B. Agreement, Schedule A or C. Salary includes London allowance. Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E. for post (a) and Corporate Membership for posts (b) an advantage.

(b) BOILER HOUSE SUPERINTENDENT, DEPTFORD EAST GENERATION STATION (Vacancy No. 54/645). Wide experience necessary in the efficient operation and maintenance of large modern generating plant and auxiliary equipment, together with ability to plan and organise work to a strict time schedule. Experience in control of labour with modern concept of management essential. Salary Class J, Grade 6 = £927 3s. p.a.

(a) STATION SHIFT CONTROL ENGINEER, GROVE ROAD GENERATING STATION (Vacancy No. 54/646). Sound engineering training with some experience in control and operation of steam generating plant and main switchgear in modern power station. Salary Class F, Grade 10 = £665 17s. p.a.

(b) SECOND ASSISTANT TO GENERATION ENGINEER (OPERATION), GROUP IV H.Q. (Vacancy No. 54/647). Power station operational maintenance experience necessary with ability to discuss station efficiency problems with station supervisory staff using own initiative. Administrative experience an advantage. Salary Class AX, Grade 2 = £875 14s. to £1,018 10s., rising to ultimate maximum Class EX = £1,133 per annum.

Applications, quoting vacancy number, may be made on form obtainable from Divisional Secretary, British Electricity Authority, London Division, P.O. Box No. 136, Generation House, Great Portland Street, London, W.1, and be received within 14 days of this advertisement. 4496

SOUTH EASTERN GAS BOARD

Technical Assistant, Electrical Engineer's Department (at Fairfield Street, Wandsworth, London, S.W.18)

APPLICANTS should be Graduates of the Institution of Electrical Engineers or should hold equivalent qualifications.

Applicants must be familiar with the installation and operation of A.C. and D.C. generating plant, transformers, switchgear, mercury-arc rectifiers and A.C. and D.C. motors and cable systems.

They must be capable of making periodical inspections of electrical equipment and preparing reports thereon, designing electric power and lighting installations and preparing specifications relating thereto.

Salary within the range £720-£820 p.a.

Applications in writing, quoting reference V20/448, and giving full details, should reach the undersigned within fourteen days.

R. J. McCRAE,
Katharine Street, Personnel Manager.
Croydon. 4529

SOUTHERN ELECTRICITY BOARD

Assistant Engineer (Maintenance and Operation)

WEYMOUTH District of No. 4 (Bournemouth) Sub-Area. Salary N.J.B. Class E, Grade 9, Column 1 (£587 per annum). N.J.B. conditions of service.

The duties of the post will be to assist generally with the operation and maintenance of the H.V. and L.V. overhead and underground distribution systems working at voltages up to 33,000, with particular attention to the testing and commissioning of new work and to special testing, including fault location. Qualifications required are a sound technical training and experience of similar work. The appointment will involve standby duties.

The successful candidate will be required to contribute to the B.E.A. and Area Boards Superannuation Scheme, if eligible.

Applications on the standard form and in envelopes suitably endorsed must reach the Sub-Area Secretary, 1, Priory Road, Bournemouth, not later than 27th August, 1954. 4528

AIR MINISTRY

MECHANICAL AND ELECTRICAL ENGINEERS required in Works Department for design, operation and maintenance of mechanical and electrical services on R.A.F. stations at home and overseas and Civil Aviation stations. Appointments in two grades (a) Main Grade, salary scale £1,000 to £1,320 and (b) Assistant Grade £650 to £1,000. Starting pay according to qualifications and experience. Salaries somewhat lower in provinces. Candidates should be age 25 or over. Appointments temporary and non-pensionable but with long term possibilities. Special allowance up to £1,500 a year according to location payable in addition to salary during overseas service. Candidates must be natural born British subjects of natural born British parents.

Minimum qualifications and experience for both grades of posts:—

(i) (a) University degree or equivalent diploma in electrical and/or mechanical engineering and at least a two-year apprenticeship or (b) Graduate or Corporate Membership of the Institutions of Mechanical or Electrical Engineers with appreciable electrical engineering experience and at least three years apprenticeship and (ii) employment in responsible position for minimum of three years with well-established engineering concern providing wide experience in electrical and mechanical engineering practice.

Application forms, quoting reference D1/54A, from M.L. & N.S., Technical and Scientific Register (K), Almack House, King Street, London, S.W.1. 3958

NOTTINGHAMSHIRE EDUCATION COMMITTEE

County Technical College, Blyth Road, Worksop (Principal: A. E. Fox, M.C., B.Sc.)

APPLICATIONS are invited for the following appointments, to commence as soon as possible:—

(1) ASSISTANT LECTURER for ELECTRICAL ENGINEERING AND ALLIED SUBJECTS to Ordinary and Higher National Certificate Examinations standard. Applicants should possess a degree or the equivalent.

(2) ASSISTANT LECTURER for MINING ENGINEERING & ALLIED SUBJECTS. Applicants should possess a degree or H.N.C. in Electrical Engineering. Graduates will be expected to teach to O.N.C. and H.N.C. Electrical Engineering Examinations standard. Possessors of H.N.C. will instruct in Craft Courses S1—S111.

Salaries: Burnham Technical Scale, Grade A (Men £415 × £18 to £670 per annum, plus additions for approved qualifications and experience).

Forms and further particulars may be obtained from the Principal by forwarding a stamped addressed foolscap envelope. Closing date 30th August, 1954.

J. EDWARD MASON,
Director of Education.
4435

BRITISH ELECTRICITY AUTHORITY

Yorkshire Division

SHIFT CHARGE ENGINEER required at Keadby Power Station, Near Scunthorpe, ultimate capacity 360 MW.

Salary £817-£852 per annum. Class J, Grade 7, National Joint Board Agreement.

Applicants must have had a sound technical training and experience in the operation of a modern power station and preference will be given to candidates who are Corporate or Graduate Members of the Institution of Electrical Engineers and/or Institution of Mechanical Engineers, or who hold equivalent qualifications.

Application forms, obtainable from the Divisional Secretary (Establishments), British Electricity House, St. Mary's Road, Leeds, 7, to be returned within 14 days of the appearance of this advertisement.

G. A. VOWLES,
Divisional Controller. 4448

BRITISH ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for the following posts:—

GENERAL ASSISTANT ENGINEERS AND JUNIOR ENGINEERS, TECHNICAL DEPARTMENT. (S/13.555).

Applicants should have had suitable experience of technical work in relation to either system development, metering or protective gear.

Preference will be given to those who either possess qualifications and experience admitting to corporate membership of a recognised professional institution, or who are studying for the examinations of such an institution.

Salary, General Assistant, AX/CX 8, £501-£675; Junior Engineer, AX/CX 9, £390-£556.

ENGINEERING DRAUGHTSMAN (MECHANICAL), CONSTRUCTION DEPARTMENT, DIVISIONAL HEADQUARTERS, PORTSMOUTH. (S/13.556).

Applicants should have had experience of work concerning turbines and auxiliaries, boilers and auxiliaries, coal and ash handling plant, and pipework.

Candidates should have a good technical education in mechanical engineering.

Salary N.J.B. Schedule D, Grade 5 (£567-£671), or Grade 6 (£433-£567), according to qualifications and experience.

Special application forms, obtainable from P. D. A. Oliver, Divisional Secretary, 111, High Street, Portsmouth should be returned by 25th August, 1954. 4520

DESIGN ENGINEERS

THE ENGLISH ELECTRIC CO. LTD. invite applications for the following positions in their Mechanical Engineering Department at Luton:—

SENIOR DESIGN ENGINEERS. Age 28-35. Minimum qualifications H.N.C. standard with sound engineering training and experience. Applicants must be capable of initiating original designs, and some supervisory experience would be an advantage but not essential.

JUNIOR DESIGN ENGINEERS. Age 24-38. O.N.C. standard, to work in conjunction with Senior Engineers developing designs to a fully completed stage. A sound knowledge of workshop practice is desirable.

All positions require a thorough drawing office background in light/medium mechanical or electro-mechanical engineering. Successful applicants would be engaged on the original design of a wide variety of laboratory equipment, test rigs and specialised machines. Good salaries and conditions for the right men. Apply to Dept. C.P.S., 336/7, Strand, London, W.C.2, quoting ref. 1261A. 4341

BRITISH ELECTRICITY AUTHORITY

South Eastern Division

(1) THIRD ASSISTANT ENGINEER required at the central maintenance workshop situated at Croydon B Power Station. Applicants, who must be capable of controlling labour should have had experience in modern workshop practice including turning, milling, grinding, welding and medium plating work. Knowledge of power station plant repairs, together with ability to assess and estimate on work to be carried out essential. Class AX/DX, Grade 5, commencing at £681 9s. p.a.

(2) GENERAL ASSISTANT ENGINEER in the Operation Department at Divisional Headquarters, Kingston. Applicants should have a sound knowledge of electronics as applied to industry and have ambition and the ability to work effectively as a member of a team. Duties will include the application of electronics and low voltage electric circuits to power station operation and maintenance. Class AX/DX, Grade 8, commencing at £526 1s. p.a.

N.J.B. Conditions of Service. Salaries quoted include London allowance. Applications giving details of education, present position, experience, etc., and quoting vacancy number should be received by Establishments Officer, British Electricity House, Lower Ham Road, Kingston-upon-Thames by 26th August, 1954. 4521

BRITISH ELECTRICITY AUTHORITY

North West, Merseyside and North Wales Division

APPLICATIONS are invited for the following appointments in the Liverpool Office of the Construction Department, Springwood House, Liverpool.

(a) SENIOR DRAUGHTSMAN (Mechanical).
(b) SENIOR DRAUGHTSMAN (Electrical).

Salary for both appointments £567/£671 per annum, Grade 5, Schedule D of the N.J.B. Agreement. Superannuable and subject to medical examination.

Applicants for (a) should have had a good general and technical education, preferably possess the Higher National Certificate in Engineering and have had some experience in a drawing office associated with the construction of modern power stations or associated plant.

For (b) should have had a good general and technical education, preferably possess the Higher National Certificate in Electrical Engineering and have had some experience in a drawing office associated with the construction of modern power stations and/or an electrical plant manufacturing works.

The successful applicant for both appointments will be required to prepare drawings and diagrams associated with power station plant and equipment, and check drawings and diagrams submitted by contractors.

Application forms obtainable from the Divisional Controller, Beaconsfield Road, Woolton, Liverpool. Closing date, 21st August, 1954. 4516

EAST MIDLANDS ELECTRICITY BOARD

Appointment of First Assistant District Engineer

APPLICATIONS are invited for the position of FIRST ASSISTANT DISTRICT ENGINEER in the Nuneaton District, Leicestershire and Warwickshire Sub-Area.

Applicants should have a sound training in electrical engineering and a wide experience in the construction, operation and maintenance of 33-kV, 11-kV and L.V., A.C. and D.C. underground and overhead systems.

Qualifications to the standard of the Higher National Certificate or equivalent are desirable and Corporate Membership of the Institution of Electrical Engineers would be an advantage.

The successful applicant will be required to reside in the district and to undertake standby duties.

Salary N.J.B. Class E, Grade 5, £740/£774 per annum.

Applications giving details of age, qualifications and experience, should be forwarded to the Sub-Area Manager, East Midlands Electricity Board, Upper Bond Street, Hinckley, Leicestershire, not later than 28th August, 1954. 4494

SOUTH WALES ELECTRICITY BOARD

COMMERCIAL ASSISTANT required, District 342 (Merthyr) in the Central Sub-Area.

Applicants must have had experience in the application of electricity to commercial and domestic premises and all general purposes.

Salary Class E, Grade 13 (£447/£453/£460) of N.J.B. Schedule.

Applications stating age, present position and salary, qualifications, experience and three referees, to be addressed to the Secretary to arrive by 21st August.

D. G. DODDS,
Secretary.

St. Mellons,
Cardiff. 4524

PRODUCTION MANAGER

M.T.E. CONTROL GEAR LTD. require fully experienced PRODUCTION MANAGER. Must be completely conversant with machine shop and control gear assembly practice. Immediate managerial status and excellent future opportunities. Apply giving full details of previous experience to:—

M.T.E. CONTROL GEAR LIMITED
London Road, Leigh-on-Sea
Essex 4388

LONDON ELECTRICITY BOARD

Operation and Maintenance Branch

APPLICATIONS are invited for the following positions in the Forest District of the North Eastern Sub-Area at South Woodford, E.18.

ENGINEER (O. & M.). Applicants should have had a sound technical education and possess a practical experience of all branches of engineering work associated with the organisation of a district distribution department, particularly in regard to substations and mains work.

The post is graded under Schedule A of the National Joint Board Agreement as Class E, Grade 11, £550 4s. per annum rising to £567 per annum, inclusive of London allowance.

JUNIOR ENGINEER (O. & M.). Applicants should have had a sound technical education, up to at least National Certificate standard, with practical experience on both D.C. and A.C. distribution systems and with the preparation and keeping of associated records.

The post is graded under the National Joint Board Agreement as Class E, Grade 15, commencing salary £415 per annum inclusive, rising, in accordance with Clause 25, to Grade 14, £470 per annum, inclusive of London allowance.

Application forms obtainable from Personnel Officer, 46, New Broad Street, E.C.2. Please enclose addressed envelope, state particular vacancy applied for and quote ref. V/1790/66/R. on envelope and all correspondence. Completed application forms to be returned by 31st August, 1954. 4530

AIR MINISTRY WORKS DEPARTMENT

requires in London and Provinces ELECTRICAL ENGINEERING DRAUGHTSMEN in Designs Branch. Applicants should have several years' experience in preparation of schemes for illumination and electrical equipment of buildings or in electrical distribution, H.V. and M.V. Appointments carry liability for overseas service for which allowances payable.

Salaries up to £780 p.a., starting pay dependent on age, qualifications and experience. Overtime or extra duty allowance payable. Reasonable promotion prospects. Posts temporary and non-pensionable but have long-term possibilities. Competitions held periodically to fill established vacancies.

Applications from natural-born British subjects only, quoting A/S and stating age, qualifications and previous appointments, giving dates and stating type of work done, to—Air Ministry, S.2(h)/NA, Cornwall House, Stamford Street, London, S.E.1. 4451

BRITISH RAILWAYS

Southern Region

ELECTRICAL ENGINEERING TECHNICAL ASSISTANTS are required for work connected with Electric Rolling Stock. General workshop experience an advantage. Applicants should not be more than 30 years of age and have a sound technical training, having reached Higher National Certificate in Electrical Engineering standard, or equivalent.

Commencing salary £350 p.a. at age 22 rising to £521 10s. p.a. at age 30. Applicants holding certain academic qualifications may receive up to £75 p.a. in excess of these rates.

Applications in writing to be addressed to Mechanical & Electrical Engineer, 15, St. Thomas St., London Bridge, London, S.E.1. 4374

TRANSFORMER DESIGNERS

Bruce Peebles & Co. Ltd., Engineers, Edinburgh, 5

invite applications for the following positions:—

CHIEF DESIGNER in charge of the Transformer Design Department and fully responsible for design of transformers of all sizes up to 150 MVA at voltages up to 275 kV. This is an important and attractive position with full scope for initiative. A commensurate salary will be paid to a man of proved ability.

ASSISTANT DESIGNER experienced in design of distribution and medium-size power transformers. Salary commensurate with experience.

Applications with full details to Mr. R. W. Flux, Manager, Transformer Department, at above address. 4376

SUNDERLAND EDUCATION COMMITTEE

The Technical College

Principal: D. A. Wrangham, M.Sc.(Lond.) Sen.Wh.Sc., A.C.G.I., D.I.C., M.I.Mech.E.

APPLICATIONS are invited for the post of LECTURER in the Electrical Engineering Department.

Candidates must have a degree in electrical engineering, and have had industrial experience. Teaching experience and practical experience in mining electrical engineering would be a strong recommendation.

The work of the department includes courses for the B.Sc. Degrees of Durham and London Universities, the Higher National Diploma and Certificate in Electrical Engineering, and Electrical subjects of Mining Courses.

Duties to commence as soon as possible.

Salary in accordance with the scale for Lecturers in the Burnham Technical Report, £965 × £25 to £1,065.

Forms of application and further particulars may be obtained from the Registrar, Technical College, Sunderland, Co. Durham.

Applications should be returned to the undersigned on or before 28th August, 1954.

Canvassing will be a disqualification.

W. THOMPSON,
Director of Education.

Education Offices,
15, John St., Sunderland. 4526

BRITISH ELECTRICITY AUTHORITY

South West Scotland Division

Maintenance Engineer (Electrical)

Kilmarnock Generating Station

APPLICATIONS are invited for the position of Maintenance Engineer (Electrical) at Kilmarnock Generating Station.

Applicants should have received a good technical education and have extensive experience of electrical equipment and the organisation of maintenance in a power station. The salary will be Grade 6, Class F of Schedule A of the N.J.B. Agreement.

Applications on Form A.E.6, which may be obtained from Divisional Headquarters or any Divisional Office of the Authority, should be forwarded to 168, Broomhill Drive, Glasgow, W.1, before 28th August, 1954. 4517

BRITISH ELECTRICITY AUTHORITY

STATISTICAL ASSISTANT required in the Commercial Department at Headquarters, London.

Candidates should have a university degree in mathematics or economics, with statistics as special subject. Some practical experience in electricity supply industry would be an advantage. The duties will be to assist in applying statistical methods, especially sampling, regression analysis, etc., to electricity supply problems.

Salary within N.J.C. Grade 4, £635-£698 p.a. inclusive of London allowance, according to qualifications and experience.

Applications stating age, qualifications, experience and present position and salary to D. Moffat, Director of Establishments, Winsley Street, London, W.1, to be received by 23rd August, 1954. Please quote ref. ER/503. 4466

UNIVERSITY OF GLASGOW

Lectureship in Electrical Engineering

APPLICATIONS are invited for a LECTURESHIP IN ELECTRICAL ENGINEERING. Salary scale £500 × £50 to £1,100. Initial salary according to experience and qualifications. F.S.S.U. and family allowance benefits. Teaching experience essential. Special knowledge of theory and operation of electrical machinery required.

Applications (5 copies), including the names of three referees, should be lodged not later than 11th September, 1954, with the undersigned, from whom further particulars may be obtained.

ROBT. T. HUTCHESON,
Secretary of University Court.
4527

NATIONAL COAL BOARD

North Eastern Division

APPLICATIONS are invited for the post of ELECTRICAL ENGINEERING ASSISTANT on the staff of the Divisional Chief Architect at Denaby Main, Nr. Doncaster.

Candidates should have served an apprenticeship with a firm of repute and hold the Ordinary National Certificate for Electrical Engineering or equal qualification, and be able to prepare layouts, specifications and approximate estimates for lighting and power circuits, switchgear and transformers for industrial buildings, and should be competent to supervise electrical contracts for such work.

Minimum salary £450 per annum, but the appointment may be at a higher salary according to the qualification and experience of the successful candidate.

The work of the department covers pithead baths, canteens, medical centres, workshops, offices, laboratories, etc.

Applications for the above appointment should be made on form S.8A, obtainable from Mr. J. A. Dempster, F.R.I.B.A., Divisional Chief Architect, National Coal Board, North Eastern Division, P.O. Box No. 4, Denaby Main, Nr. Doncaster, and should be returned not later than 27th August, 1954. 4497

FERRANTI LTD.

invite applications for the following vacancies in their Power Transformer Department:—

(1) ENGINEERS FOR DESIGN AND DEVELOPMENT work in large transformers, voltage regulators and specialised high-voltage equipment. Qualifications include a degree or H.N.C. in electrical engineering and previous design or development experience in power engineering. (Ref. TE.)

(2) DRAUGHTSMEN (ELECTRICAL OR MECHANICAL) with previous experience in power engineering. (Ref. TD.)

Applications are also invited from young graduates completing National Service either for direct employment or for practical works training. (Ref. TG.)

Vacancies also exist for graduate-apprentices wishing to undertake a planned two-year course of training for design, research and development, production or sales, prior to National Service. (Ref. PGA.)

The company operates a staff pension scheme. Application forms from Mr. T. J. Lunt, Staff Manager, Ferranti Ltd., Hollinwood, Lancs. quote appropriate reference. 4377

BRITISH ELECTRICITY AUTHORITY

THIRD ASSISTANT ENGINEER or PHYSICIST required at the RESEARCH LABORATORIES, LEATHERHEAD.

Candidates should have a university degree in electrical engineering or physics, and some research experience is desirable. Duties include testing, development and research work in the laboratories and in the field in connection with the generation, transmission and distribution of electricity.

Salary within N.J.B. Grade 4, £717-£852 p.a. according to qualifications and experience, rising to a maximum of £934 p.a.

Applications stating age, qualifications, experience and present position and salary to D. Moffat, Director of Establishments, Winsley Street, London, W.1, to be received by 20th August, 1954. Please quote ref. ER/501. 4437

BRITISH ELECTRICITY AUTHORITY

North West, Merseyside and North Wales Division

APPLICATIONS are invited for the appointment of ASSISTANT MAINTENANCE ENGINEER (Mechanical) at the Bromborough Power Station, Cheshire. Salary £717/£748 per annum, N.J.B. Class H, Grade 8. Superannuable and subject to medical examination.

Applicants should preferably be Associate Members of the Institution of Mechanical Engineers or possess equivalent qualifications, and must have wide experience in the maintenance of mechanical plant in a modern power station.

Application forms may be obtained from the Divisional Controller, Beaconsfield Road, Woolton, Liverpool. Closing date 25th August, 1954. 4475

BRITISH ELECTRICITY AUTHORITY

ASSISTANT TO THE REGIONAL SAFETY OFFICER required in Manchester Area. Applicants should have good engineering qualifications, a knowledge of the Factories Acts and Safety Regulations, and preferably some experience in accident prevention in the supply industry.

Duties include assisting in making recommendations for safety measures and reporting on accidents.

Salary N.J.B. Grade 3, £800-£1,056 according to qualifications and experience, rising to a maximum of £1,159.

Applications stating age, present salary, and giving full details of qualifications and experience, to D. Moffat, Director of Establishments, Winsley Street, London, W.1, by 18th August, 1954. Please quote ref. ER/500. 4436

BRITISH ELECTRICITY AUTHORITY

ASSISTANT STATISTICIAN required in the Technical Engineering and Statistics Section of the Generation Operation Branch at Headquarters in London.

Candidates should have ability in mathematics, experience of statistical methods of analysis, and be able to draw conclusions from numerical data and prepare reports, also the organisation of computations. Experience of power station practice would be an advantage.

Salary scale N.J.C. Grade 8, £935 p.a. to £1,040 p.a. inclusive.

Applications stating age, qualifications, experience, present position and salary to D. Moffat, Director of Establishments, Winsley St., London, W.1, not later than 24th August, 1954. Please quote ref. ER/502. 4438

SOUTH WESTERN ELECTRICITY BOARD

THIRD ASSISTANT ENGINEER (CONSTRUCTION), CORNWALL SUB-AREA HEADQUARTERS. Salary N.J.B. Class G, Grade 10, £608-£630 p.a.

Duties include assistance in and supervision of 11-kV and 33-kV overhead line and cable construction including 33-kV substations. Experience in rural electrification and possession of H.N.C. most desirable.

Applications on forms obtainable from Sub-Area Manager, Pool, Redruth, to be returned by 24th August. 4523

A LARGE industrial organisation has a few vacancies for mechanical and electrical engineers. Further expansion is taking place and there is a need for men of ability who are ready to shoulder responsibility on the research, development and maintenance sides of the organisation. The appointments, which are permanent and pensionable, provide excellent opportunities for advancement. Postgraduate training leading to professional qualifications can be arranged, and normal salary will be paid during such training. Starting salaries in the range of £600-£900 per annum depending upon qualifications and experience. Candidates should hold an honours degree and be between 21 and 27 years of age. Write, giving full details of age, qualifications and experience, quoting advert. ref. Q9, to—Box 4440.

ALKALINE BATTERIES Ltd., of Redditch, are the largest makers in the Empire of alkaline accumulators, miners' lamps and emergency lighting systems, which are in rapidly growing use particularly for export. The company has vacancies in its technical sales and development sections for graduate electrical engineers, not over 30 years of age, or for men nearing the end of their degree course who have completed National Service. The posts are pensionable and offer the prospect of executive rank. Applications with full educational details and experience should be addressed —Commercial Manager, Alkaline Batteries Ltd., Union Street, Redditch. 3936

AN internationally known electrical engineering company situated in the Midlands has an interesting vacancy for a professionally qualified engineer or a post graduate student for investigation and development work in the field of high voltage insulation mainly as applied to large machines. The position is progressive and a good salary will be paid to the successful applicant. Write in confidence, giving full particulars of age, qualifications and experience, to—Box 4534.

AGENTS required throughout the British Isles for the sale of conduit fittings and allied products. Apply—Box 4340.

ASSISTANT chief engineer required by company engaged in the design and development of guided weapons. Candidates must be mechanical engineers with first-class qualifications and experience in electronics and light engineering. Knowledge and experience in servo-mechanisms essential since duties would include responsibility for missile control systems, electrical gyros, accelerometers, etc. Applicants should be 30-35 years of age and have sufficient personality and experience to administer and organise the development activity on these subjects. Write in detail, quoting reference G, to—Box AC.91032, Samson Clarks, 57/61, Mortimer Street, London, W.1. 123

ASSISTANT engineer wanted for an engineering department which is responsible for the installation and maintenance of plant of a weldless steel tube works. The job will cover electrical and mechanical engineering and building work and will offer good opportunity for progress. The applicant must be an electrical engineer with some experience, for preference, in works of a similar nature to ours. Minimum qualification required is Graduate of I.E.E., and the desirable age 25 to 30 years. Particulars of training, experience, etc., and present salary to—Personnel Manager, Tubes Limited, Rocky Lane, Aston, Birmingham, 6. 4499

BALL bearing manufacturer requires electrical engineer to develop the sale of bearings to makers of electric motors and similar equipment. Candidates should have had extensive experience in the electrical industry, and preferably some first-hand experience of the installation of bearings. Reply with qualifications to—Box 4443.

B.B.C. require draughtsmen in London (Shepherds Bush and West End) with D.O. experience and some knowledge of electro-mechanical equipment as used in sound and television broadcasting. Starting salary £450 (may be higher if qualifications exceptional) rising by 5 annual increments to £635. Good opportunities for promotion. Apply—Engineering Establishments Officer, Broadcasting House, London, W.1, within 7 days, quoting reference E.972E.R. 4442

CONSULTING engineers require electrical designer-draughtsman, age twenty-four to thirty-five; experienced in all classes of lighting and power installations for hospitals, schools, industrial projects; preparation of contract and specifications, etc. Good draughtsmanship essential. Reply to—A. F. Myers & Partners, 147, Victoria Street, London, S.W.1. 4386

COOKE & FERGUSON Limited, switchgear specialists, require designer-draughtsman with mechanical and/or electrical experience. A.E.S.D. rates paid to experienced men. Reply stating age, qualifications and experience to—Personnel Officer, Victoria Street, Openshaw, Manchester, 11. 4455

COST clerk for small West End contractors (E.C.A.). Used to general office routine, P.A.Y.E. Write in first instance, stating age, experience and salary required.—Charing Cross Electrical Inst. Co. Ltd., 61, Chandos Place, Strand, London, W.C.2. 4444

DESIGN draughtsman required for M.V. and and E.H.V. switchgear; H.N.C. or equivalent. Salary commensurate with qualifications. Pension scheme. Works in country situation, 20 miles London. Accommodation can be arranged. Apply—Chief Engineer, J. G. Statter & Co. Ltd., Amersham Common, Bucks, marked "Confidential." 4373

DESIGN engineer for power rectifiers is required by a large manufacturing organisation in the Midlands, for work of exceptional interest with good prospects. No previous rectifier experience is necessary, but candidates should have degree or good H.N.C. and some practical training. Excellent residential and educational district. Please write with full details to—Box No. 1305, T. & G., 167, High Holborn, London, W.C.1. 4445

DESIGN engineer required by progressive engineering firm, having experience in the electrical design of f.h.p. motors. Salary according to age and experience. 5-day week. Pension and life assurance scheme. Please apply in writing, giving details of previous experience and salary required, to—Chief Engineer, Ranco Ltd., Newhouse Industrial Estate, Motherwell, Scotland. 4500

CONTROL gear agents required with established connections for the sale of a unique and outstanding range. Write, stating experience and area covered, to—Box 4339.

DESIGNER required for work on medium and high-voltage power factor correction and furnace capacitors. Must have degree or H.N.C. or the equivalent in electrical engineering, and experience in the design and manufacture of medium/heavy electrical equipment. Good prospects. Write, giving full details of qualifications, age and salary required, to—The Technical Director, A. H. Hunt (Capacitors) Ltd., Bendon Valley, London, S.W.18. 71

DESIGNER draughtsman preferably with experience on electro-mechanical instruments and components. H.N.C. (Mech.) standard with workshop training desirable. Good prospects and conditions with pension scheme. Location S.E. London. Full particulars and salary required to—Box 4535.

DRAUGHTSMAN required for design and detail work on electrical/mechanical apparatus. Should be at least of H.N.C. standard. Workshop experience essential. Apply in writing to—Personnel Manager, A. H. Hunt (Capacitors) Ltd., Bendon Valley, Garratt Lane, London, S.W.18. 41

DRAUGHTSMAN required for transmission tower drawing office. Must be neat and efficient and have had experience and knowledge of electrical control equipment and circuits. Structural experience, though an advantage, would not be necessary for the work involved. Apply in writing to—J. G. Davies, Chief Electrical Engineer, Blaw Knox Ltd., 90/94, Brompton Road, London, S.W.3. 4511

DRAUGHTSMEN. Previous experience in motor control equipment circuit work helpful but not essential if applicants are up to O.N.C. standard. Good salary and prospects. For successful applicants requiring housing accommodation, assistance may be given for skilled and key personnel. Pension scheme; 5-day week; canteen. Details of age, experience, qualifications and commencing salary to—Personnel Officer, Dewhurst & Partner Ltd., Inverness Road, Hounslow, Middlesex. 4200

DRAUGHTSMEN, senior and junior, experienced in the design of any of the following: (a) Air-break circuit breakers; (b) High-tension circuit breakers and metalclad switchgear; (c) Switch and control board layout; (d) Layout of industrial control contactor cubicles; (e) Diagrams of connections. Applications are also invited from draughtsmen who have had a good experience in genera mechanical work. Good working conditions, superannuation, etc. Apply giving full particulars to—The General Electric Co. Ltd., Witton, Birmingham 6. 4467

ELECTRICAL contractor requires assistant to deal with requisitioning, ordering and batching of materials and general storekeeping duties at Iver Heath, Bucks. Light duties; 40-hr. week. Apply in first instance by letter to Wilkins, 35, West Towers, Pinner, stating age, experience and salary required (over 40 not barred). 4446

ELECTRICAL design engineer, age 25-30, required. University Degree in Electrical Engineering desirable. Knowledge of rolling mill electrical equipment and experience with large electrical manufacturers essential. Applications, stating age, qualifications, experience and salary required, should be sent to Personnel Officer, Davy and United Engineering Company Limited, Park Iron Works, Sheffield, 4. 4537

ELECTRICAL draughtsman required by firm of consulting engineers for work on lighting and power installations for all classes of building. Applicants should have practical experience and should be capable of preparing specifications under supervision. Qualifications O.N.C. minimum. Write stating qualifications, experience, age and salary required to—J. Roger Preston & Partners, 15, North Audley Street, London, W.1. 4421

ELECTRICAL draughtsman required Park Royal area. Should have experience in lighting and power installations for retail shops, manufacturing and processing depots; 5-day week; canteen. Good salary for suitable man. Pension scheme. Apply in writing stating age and experience, etc., to—United Dairies, Engineering Department, Cumberland Avenue, Park Royal, London, N.W.10. 4479

ELECTRICAL draughtsmen, two senior. Higher National Certificate standard. Apply to—Chief Engineer, The Bowater Paper Corporation Limited, Northfleet, Kent. 4375

ELECTRICAL draughtsmen required by Albright & Wilson Limited, Oldbury, for their Central Engineering Department. The duties will mainly consist in the detail of power and lighting installation of chemical and allied plant. Apply in writing, giving full particulars of previous experience, qualifications, age, etc., to the Personnel Department. 4538

ELECTRICAL engineer required by small firm in N.E. England to supervise the testing and control the quality of low tension control gear. Must also be able to calibrate and check electrical indicating instruments and to design and specify the grading of field rheostats for special purposes. Will be responsible for checking and correcting wiring diagrams, schematics, installation and maintenance instructions. Applications, stating age, qualifications, experience and salary required, to—Box 4536.

ELECTRICAL engineer, university graduate, Cambridge or Oxford preferred, required as manager of new offices to be opened in London by one of the best-known electrical contracting organisations in Britain. This post offers unique opportunities of advancement to young engineer able to handle staff and clients and with initiative and enterprise. Apply, stating age, training, experience and qualifications, to—Box 4478.

ELECTRICAL fitter required by the British Electricity Authority at their Nottingham Transmission Section. Rate of pay 45d. per hour, 44-hour week. Terms and conditions of service in accordance with N.J.I.C. Agreement. Applications in writing to the Divisional Establishments Officer, British Electricity Authority, P.O. Box No. 25, Barker Gate, Nottingham. Please quote Vacancy No. 109/54/ER. 4519

ELECTRONIC engineer required by capacitor manufacturers (East London) for development work on test instruments and electrical research. Opportunity for young engineer with some years' experience.—Box 4225.

ENGINEER required for the development of a wide range of fractional horse-power motors. Experience of this work and H.N.C. (Elect.) or equivalent essential. Salary approximately £700 to start. Candidates, aged 25-35, should apply in writing stating age, education, qualifications and experience to—The Employment Office, Hoover Ltd., Perivale, Middx. 4382

EVERSHED & VIGNOLES Ltd., Chiswick, London, W.4, require a technical assistant to join their outside sales staff. Applicant educated to Higher National Certificate standard and having knowledge of industrial measurements, especially pyrometry, would be preferred. Salary according to experience and qualifications. 4447

IMPERIAL CHEMICAL INDUSTRIES Ltd., Wilton Works, near Redcar, has a vacancy for an experienced buyer. Applicants should have had wide experience in a purchasing organisation and have specialised knowledge of the purchasing of mechanical and electrical engineering equipment and plant. The appointment will be of established staff status with membership of the company's staff pension scheme. Applications should be submitted in writing on a form obtainable from the Staff Officer, Imperial Chemical Industries Limited, Wilton Works, Middlesbrough, Yorkshire, quoting advertisement ref. ICI/X/193/j. 4441

JUNIOR assistant mechanical engineer wanted Westminster, must be good draughtsman and willing to go abroad short trips, if possible some experience electrical work. Applications giving brief particulars, to—Box 4539.

JUNIOR engineer (21-25) required in estimating department by elec. contractors (Westminster). Good prospects. Write stating experience, age, salary reqd.—Box 4501.

JUNIOR lighting engineer, preferably with electrical background required by large manufacturers of lighting equipment. Write stating age, experience and salary required to—Box 331, Allardyce Palmer Ltd., 109, Kingsway, London, W.C.2. 4448

KEEN young sales engineer required as Midlands representative by manufacturers of all forms industrial m.v. switchboards, cubicles, control panels, substation switchboards, feeder pillars, etc., with full range heavy duty combination fused switches to 800 amps. and full industrial and domestic range of fusegear. Give details of experience in confidence to—Managing Director, Dennis Switchgear, Fleming Road, Speke, Liverpool. 4422

LABORATORY staff. Assistants are required for electrical, chemical and physical laboratory work for the control testing of raw materials used in power cable manufacture. Past experience not essential but ordinary or higher national certificate standard preferred. Candidates must have completed National service. Reply stating full background and salary required, to B.I.C. (Submarine Cables) Ltd., c/o The Secretary, W. T. Glover & Co. Ltd., Trafford Park, Manchester, 17. 4540

LIFT erector and serviceman and experienced engineer required by Nottingham firm, able trace and rectify electrical faults in lift systems; permanency. State age, experience. —Box 4449.

MAJOR oil company has vacancy in Middle East for electrical engineer. Successful candidate should be equivalent to electrical repair shop foreman in U.K. and must be capable of rewinding motors up to 650 h.p. at 3,300 volts and of emergency repairs to alternators of 7,500 kVA at 11,000 volts including in the case of the former impregnation drying out, refitting of new bearings (ball, roller and sleeve) and final running in tests. Motors are F.L.P. necessitating knowledge of gap setting and micrometer measurements with machinery instructions when new F.L.P. seals are to be fitted. Reasonable knowledge of transformers and coil winding and shop overhaul of switchgear and general, including domestic, electrical equipment is also desirable. Age not over 35. Salary depending on qualifications and experience plus generous allowance in local currency, free passages out and home, free medical attention, kit allowance, good leave arrangements, pension scheme. Write stating age and full details of qualifications, quoting F.116, to Box 1186, c/o 191, Gresham House, London, E.C.2. 4531

MAJOR oil company require an electro-mechanical draughtsman for design and detail work on experimental laboratory equipment at their research station near London. Applicants under 30 years of age. Must be in possession of Ordinary National Certificate and if possible should have had 2 years' workshop experience. Salary according to age, qualifications and experience. Pension scheme. Write giving full details and quoting H.3156, to Box 6867, c/o 191, Gresham House, London, E.C.2 4532

MANAGER for electrical installation department. Must be capable of designing, estimating and supervising all types of installation. Please give details of experience and salary required.—Simpson Brothers (of Hapton) Ltd., Hapton, Burnley. 4384

MANCHESTER firm of contractors require working foreman used to erecting concrete and steel columns for road lighting and capable of controlling workmen. Must be willing to travel. High salary and generous expenses. Only men with experience and organising ability need apply.—Box 4394.

MINISTRY OF LABOUR AND NATIONAL SERVICE requires an electrical engineer for unestablished post at the Technical and Scientific Register. Candidates (preferably over 25) should hold degree or diploma in electrical engineering and/or equivalent professional qualification, with varied experience of light electrical engineering, including electronics. Duties: assistance in placing work of Register, involving interviews, advice on careers and correspondence. Salary within scale £380 to £745 (£495 at age 25). Application forms from M.L.N.S., Technical and Scientific Register (K), 26, King Street, London, S.W.1, quoting ref. D.408/54. Closing date 28th August, 1954. 4450

MITCHAM WORKS Limited have vacancies for technical assistants able to carry out without close supervision measurements on radio and/or television receivers and associated components. These posts offer excellent opportunities for young men to enter the factory laboratory of a leading receiver manufacturer. Commencing salaries in accordance with age, experience and qualifications. Candidates, who should have academic qualifications in radio to the standard of H.N.C., should apply in writing to the Personnel Officer, Mitcham Works Limited, New Road, Mitcham Junction, Surrey, quoting reference G.1. 4452

MOTOR winding foreman required by West London firm. Progressive permanent post for fully experienced man able to carry out without supervision rewinds, repairs, etc., all types motors, fractional to 10 h.p., A.C. and D.C.—Box 7538.

MECHANICAL engineer with good technical qualifications required for 80-MW industrial power station. Age not less than 30. Commencing salary £950 to £1,100, with generous non-contributory pension scheme. Up-to-date and responsible power station experience essential. Apply in writing to—Salaried Personnel Department, Ford Motor Company Limited, Dagenham, Essex, quoting ref. PHE. 4424

PROCESS control staff. Assistants are required for controlling the manufacturing processes during power cable production. Past experience not essential but mechanical engineering background advantageous. Ordinary or Higher National Certificate standard preferred and candidates must have completed National service. Reply stating full background and salary required, to B.I.C. (Submarine Cables) Ltd., c/o The Secretary, W. T. Glover & Co. Ltd., Trafford Park, Manchester 17. 4541

QUALIFIED engineer (British), age 22-25, with degree or equivalent and workshop training, required by company (London district) whose activities will enable experience to be gained in high-voltage insulation practice. Submit details to—Box 4480.

REPRESENTATIVE required by leading manufacturers of contemporary lighting fittings to cover London electrical contractors and wholesalers. Good prospects on salary basis offered in newly formed division to keen young man with real ability who is prepared to work hard. Give full particulars of previous posts and salaries to — Sales Manager, The Merchant Adventurers Ltd., 43, Portland Rd., London, W.11. 4400

REPRESENTATIVE required by well-established manufacturers of high grade switches to cover Northern Counties. Contact with area boards and leading industrial organisations an advantage and one or two other agencies in electrical line not objected to. Reply giving full details including experience and remuneration expected, to—Box 4543.

REPRESENTATIVE required for E.L.M.A. lamps to cover Dorset, Hants and Sussex. Experience desirable, car an advantage.—Pope's Electric Lamp Co. Ltd., 5, Earnshaw Street, New Oxford Street, London, W.C.2. 4542

REPRESENTATIVES for first-class electrical domestic equipment. Must be car owners. Essentially wanting to work hard to launch new products. Bedfordshire, Hertfordshire, Buckinghamshire and Huntingdonshire. Write full particulars to — Napper, Stinton, Woolley Ltd. (BPD), 14-19, Great Chapel Street, London, W.1. 4502

REPRESENTATIVES required by manufacturer of diesel and petrol engine-driven generator sets, welding sets, water pumping sets and air compressor sets. Applicants should have their own offices and sales staff for the following areas: South Wales, North Wales and North-West and Eastern counties.—Box 4297.

SALES engineer required by London electrical contractors to contact and contract with industry, commerce and professions. Salary and advancement according to ability.—Box 4481

SALES manager required by electrical engineering company. Position involves complete control of all sales staff and demands a keen approach to sales technique and organisation. Qualifications sought are a record of achievement in a competitive market; technical background; plus knowledge of the application of electrical measuring instruments and/or electronic apparatus. The company offers a permanent position with pension scheme. Write, in strictest confidence, with details, stating salary expected, to—J. P. Steward, Measuring Instruments (Pullin) Ltd., Acton, London, W.3. 4360

SWITCHGEAR contracts draughtsman required for work on indoor and outdoor switchgear up to 33 kV. A.E.S.D. rates paid to experienced man. Reply stating age and experience to — Personnel Officer, Cooke & Ferguson Ltd., Switchgear Specialists, Victoria Street, Openshaw, Manchester, 11. 4453

SWITCHGEAR contracts engineers are required capable of engineering contracts for high-voltage switchgear and auxiliary apparatus. Applicants must be capable of controlling a section of the drawing office and should have H.N.C. as a minimum technical qualification. Good opportunities and salary offered to experienced engineers. Reply stating age and experience to — Personnel Officer, Cooke & Ferguson Ltd., Switchgear Specialists, Victoria Street, Openshaw, Manchester, 11. 4454

SENIOR technical estimator required. Must be technically conversant with multi-motor contactor type control equipment and auxiliary items. Position is a senior appointment and the successful applicant must have a good knowledgeable background of control equipment and its technical applications, etc. Assistance towards housing accommodation may be given if required. Pension scheme, 5-day week, canteen, etc. Please state age and salary required, together with details of experience obtained.—Personnel Officer, Dewhurst & Partner Ltd., Inverness Rd., Hounslow, Middx. 4383

SENIOR transformer engineer required to be responsible for the design of power transformers above 5 MVA and up to 132 kV. Excellent prospects for candidate with initiative and drive. London area. Accommodation available.—Box 4503.

SMART man required, City (London) showrooms, knowledge electrical accessories, fittings, domestic appliances. Write full details. —Box 4468.

TECHNICAL sales representative required by old-established English company in Uganda, representing many important U.K. manufacturers. Age 30/35, preferably single, with sound sales and estimating experience covering electrical and allied plant as applied to industrial projects. Total emoluments £900/£950 per annum; free accommodation, paid home leave and passages for each 2-year contract, mutual provident fund, free medical, low income tax. Fullest particulars in confidence to—Box 4457.

TECHNICAL sales representative required for world-wide manufacturers of electrical control gear for machine tools and industrial installations. Small training period may be necessary. Only those with previous experience in this field need apply.—Box 4456.

TECHNICAL writer required for the preparation of instruction, maintenance, service and parts manuals dealing with a wide variety of electrical and mechanical engineering plant, including turbines, electrical rotating machinery, switchgear, transformers, etc. Applicants must possess a sound technical education and experience in this work. Excellent service conditions including a non-contributory staff pension scheme. Please apply with full details training, experience, qualifications, age, salary, etc., to — The Chief Personnel Officer, Brush Electrical Engineering Company Ltd., Loughborough, Leics. 4464

THE appointment of a general sales manager for one of their subsidiary companies is being considered by Thorn Electrical Industries Ltd. Applicants, who must have a wide knowledge of lighting, particularly in the fluorescent field, should write with brief details of past experience and present occupation to—The Sales Director (Lighting Division), Thorn Electrical Industries Ltd., 105, Judd Street, London, W.C.1. 4458

THE Engineering Division of The Distillers Company Limited have vacancies in their London office for senior and junior electrical draughtsmen for power and lighting layouts, with a knowledge of flameproof installation and equipment for industrial and chemical plants. Replies giving fullest details of experience, technical qualifications, age and salary required should be addressed to — The Appointments Secretary, The Distillers Company Limited, Engineering Division, Southern Office, Devonshire House, Piccadilly, London, W.1. 4309

TRAINING officer, South Lancashire area, to co-ordinate technical studies with practical training in workshops and offices for technological and technician apprentices. Good salary for graduate or otherwise qualified engineer with previous industrial and/or service training experience. Applications to be made in writing, stating age, qualifications and full details, marking envelopes "Training Officer," to—Box 4469.

TRANSFORMER designer required for interesting work in the design of power transformers, regulators and associated control gear. Excellent prospects for the right candidate. Apply—Brentford Transformers Ltd., Kidbrooke Park Road, Kidbrooke, London, S.E.3. 4504

TRANSFORMER test engineer, senior or junior, with experience up to 10,000 kVA, 66 kV. Minimum technical qualification Ordinary National Certificate. Progressive position. Pension scheme. Apply — Brentford Transformers Ltd., Kidbrooke Park Road, London, S.E.3. 4315

TECHNICAL assistants for experimental and test dept. of long-established manufacturer, London, engaged on meter and other light engineering work. Technical training to at least O.N.C. standard is necessary. Attractive and progressive staff posts, pension scheme. State education, experience and present salary. Box 4427.

YOUNG engineers to be concerned with tendering for rolling mills electrification schemes are required by The English Electric Co. Ltd., Stafford. Applicants should preferably have H.N.C., a background of manufacturing industry experience and a bias towards commercial work. Direct experience of rolling mills an advantage but not essential. Write, quoting Ref. 489K, to—Central Personnel Services, 336/7, Strand, London, W.C.2. 4533

APPOINTMENTS FILLED

Dissatisfaction having so often been expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision? We will then insert a notice free of charge under this heading.

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ELECTRICAL Engineer, age 30, speaking colloquial Spanish, fair Arabic, with seven years' overseas employment in British and American industrial organisations. Experienced distribution, installation, maintenance, design, supervision, estimating, including also erection of long-distance transmission networks. All pressures to 138 kV, and hydro, steam, diesel, generation layouts.—Box 7527.

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AUSTRIAN, 30 years qualified electrician, holding master certificate, seeks work in England with prospects.—Box 7534.

ELECT. engr., A.M.I.E.E. (39), seeks posn. with contr. or consult. or asst. wks. elect. engr. Would consider other offers.—Box 7549.

FOREMAN-supervisor seeks progressive position home or overseas all types installations and maintenance. Car owner.—Box 7535.

METER expert desires London appointment. —Box 7548.

SALES ENGINEER (40), manager experience, Birmingham, industrial or domestic, representation or development and marketing, branch managership, etc.—Box 7544.

SUPERVISING installations engineer (43), recently completed large industrial contract abroad. Planning to completion, estimating, administration and supervision of large installations. Abroad or London area. Full particulars on request.—Box 7540.

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600-kW G. & J. WEIR/E.E.C. Geared Turbo-Alternator Set, 150/190 lb. pressure, 15 lb. back pressure; alternatively 400 kW, 100 lb. pressure, 15 lb. back pressure. Alternator 400/440/3/50.

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kVA			r.p.m.
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100	PAXMAN/BRUSH	New 1950	1000
120	RUSTON/HOUCHIN	Unused	600
70	PETTER FIELDING/BRUSH	Unused	500
66	PAXMAN/E.E.C.	New 1950	1000
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A.C. and D.C. motors, all sizes, large stocks, fully guaranteed. — Milo Engineering Works, Milo Road, East Dulwich, S.E.22 (Forest Hill 2278-9). 102

A.C. and D.C. motors, generators, from stock.—Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. (Edgware 5566/9). 91

A.C. and D.C. motors, new and reconditioned. Diesel alternator sets, generators, transformers, welders, plating equipment, switch and control gear, etc. Stock list post free.—Thos. W. Ward Ltd., Albion Works, Sheffield (Phone 26311, ext. 347). 3412

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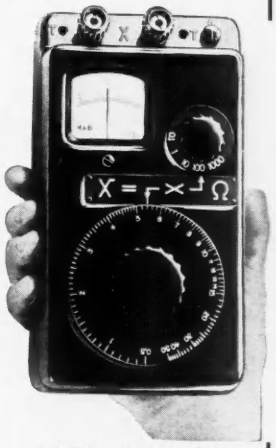

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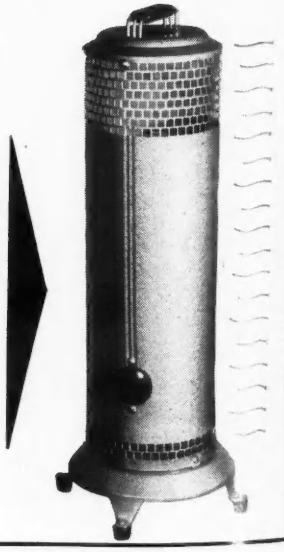

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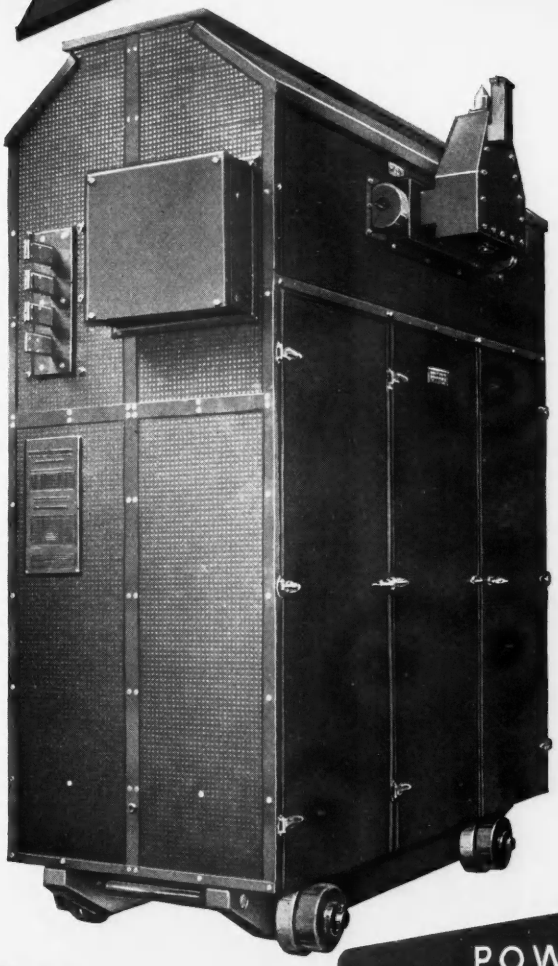

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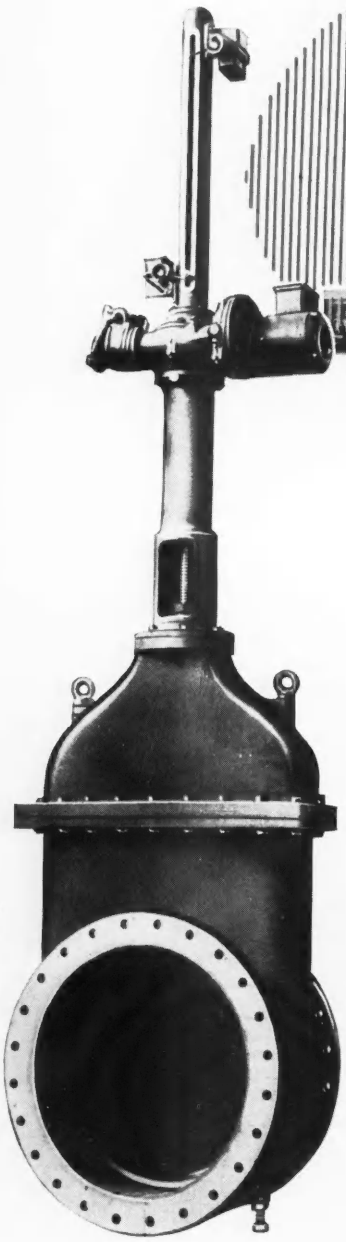

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